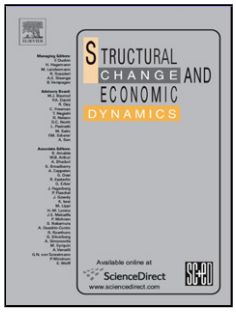
Wealth structures and income distribution of US households before and after the Great Recession



Wealth structures and income distribution of US households before and after the Great Recession

Hanna Karolina Szymborska

PII: S0954-349X(18)30291-1

DOI: https://doi.org/10.1016/j.strueco.2019.08.011

Reference: STRECO 852

To appear in: *Structural Change and Economic Dynamics*

Received Date: 17 August 2018

Revised Date: 28 May 2019

Accepted Date: 30 August 2019

Please cite this article as: Szymborska HK, Wealth structures and income distribution of US households before and after the Great Recession, *Structural Change and Economic Dynamics* (2019), doi: https://doi.org/10.1016/j.strueco.2019.08.011

Wealth structures and income distribution of US households before and after the Great Recession

Hanna Karolina Szymborska[1]

[1] **Correspondence address: The Open University, Walton Hall, Milton Keynes, MK7 6AA, UK. Email: hanna.szymborska@open.ac.uk.**

Abstract

This paper investigates the empirical relationship between household wealth composition and income inequality in the USA, proxied by households' relative position in the income distribution. Previous research highlights wealth–income interactions as important driver of inequality, but less is known about whether wealth composition is conducive to sustained improvements in relative income across households. Using non-parametric median slope analysis on the U.S. Survey of Consumer Finances between 1989-2013, the paper examines patterns of empirical regularities between wealth composition and relative income, finding significant differences over time and between income, gender, racial, and intergenerational groups. Higher relative holdings of other property, business equity, financial investment, retirement and insurance assets, and secured debt are associated with higher position in the income distribution; to be more resilient to losses after the Great Recession; and not to be enjoyed equally by households in the poorest 20% of income distribution, female, Black/Latino, and millennial households.

Keywords: Income inequality; Household Wealth; Financial sector; Non-parametric estimation

JEL classifications: C14; D14; D31; J15; J16

1. Introduction

The aim of this paper is to examine empirically the interplay between household wealth and income in generating inequality. This task is approached by investigation of the association between wealth composition and households' relative position in the income distribution over time, against the backdrop of institutional changes in the US financial sector before the Great Recession. The innovative aspect of the paper is to establish differences in empirical regularities between wealth composition and relative income across households in the context of financial

sector transformation since the 1980s in the USA, which so far have been studied at the aggregate level. Such research is important to understand which types of assets and debt holdings are associated with the largest and most lasting improvements in household's relative position in the income distribution, and whether these improvements are shared equally across social classes, gender, race, and age groups, as this cannot be gauged in the existing literature using aggregate categories of income and wealth. It is also timely given the increasing reliance on markets in increasing income wealth of vulnerable households, as evidenced by privatisation of housing and financial inclusion initiatives in advanced and emerging economies.

Using aggregate data, Piketty (2014) argues that the interactions of wealth and income are central in understanding historical trends and levels of inequality in capitalist economies. Due to compounding of interest, returns to wealth tend to outpace the growth of income. This leads to concentration of resources over time among wealth holders and their inheritors, which he identifies with the top 1-0.1% percent of the distribution. However, expansion of homeownership in the subprime lending boom and gradual privatisation of pensions opened access to wealth accumulation and capital income earnings among low-to-middle income households (Barba/Pivetti 2009; Wright 2009; Wolff/Zacharias 2013; Fontana *et al*. 2014). The period before the 2007 crisis has been characterised by extension of subprime lending, proliferation of securitised financial instruments based on loans to vulnerable households, and increasing pressures on household finances due to stagnating wage growth and privatisation of public services (Dos Santos 2009; Goda/Lysandrou 2013; Karacimen 2013). Some indicate rising household debt as the main contributing factor to the 2007 crisis (Sharpe/Flaschel 2013; Mian/Sufi 2013; Setterfield/Kim 2016). In the aftermath of the Great Recession, bursting of the house price bubble led to destruction of wealth gains for numerous households relying on homeownership as their main asset. This process had a distinct intersectional dimension. Low-income households, women, minorities, and the young were targeted by subprime lenders and suffered from higher rates of foreclosures during the crisis, which translated into long-term net wealth losses after the Great Recession (Young 2010; Henry *et al*. 2013). Given the increasing heterogeneity of household wealth and disparate trajectories of wealth accumulation before and after the Great Recession across different households, what is the relationship between wealth holdings and household's relative income?

Higher contribution to total asset portfolio of assets such as property other than main residence, business equity, retirement wealth, and high-yielding financial instruments improve household's position in the income distribution to a greater extent than if majority of wealth is stored in main residence, vehicles, and low-yielding financial assets such as bank deposits. One

reason might be that the former group of assets faces comparatively higher appreciation in value than the latter group (Williams 2016), although the precise extent of this phenomenon is difficult to infer as capital gains associated with returns to wealth are only recorded in household income when realised. Nevertheless, ownership of these high-yielding forms of wealth often necessitates large initial down payments, making them less accessible to low-to-middle income households than e.g. homeownership (with the help of mortgage financing). Similar can be observed in the case of debt. Households whose debt holdings consist mainly of secured debt can take advantage of tax breaks, and their debt payments contribute to building up of their net worth (Stiglitz 2014; Levin *et al*. 2014; Williams 2016). Conversely, households relying primarily of unsecured debt face tougher repayment conditions, which acts to the detriment of their credit worthiness rather than to increase their wealth accumulation capacity. However, not enough is known about how these empirical regularities have been affected by the subprime lending expansion in the 2000s and by the Great Recession, and whether they have been experienced to the same extent by different household groups.

This paper contributes to the inequality literature by studying how the precise structure of household wealth is associated with relative position in the income distribution for different households over time. It examines empirical regularities between specific components of asset and debt holdings and leverage and households' relative income, using non-parametric median slope analysis of data from the U.S. Survey of Consumer Finances between 1989-2013. The research hypothesis is that wealth composition is associated with different gains in relative income for various households in the context of institutional changes in the US economy since the 1980s, disproportionately benefiting the rich, Whites, males, and baby boomers. To that end, the paper investigates whether the observed empirical regularities between wealth composition and relative income hold to an equal extent for different income, gender, racial, and age groups, which were targeted by subprime lenders prior to the crisis, and how these relationships have been influenced by changes in financial sector operation before the Great Recession and in its aftermath.

Throughout this analysis, explicit attention is paid to changes in the estimated empirical regularities over time. As mentioned above, the empirically observed patterns of asset ownership along the income distribution indicate that households at the top own a more diversified portfolio of real and financial assets, while low- and middle-income households are reliant on housing and low-yielding assets (including vehicles and transaction accounts) respectively (Wolff 2014:31). The Great Recession has shown that while homeownership constitutes an important wealth-building vehicle, which is vital for long-term improvements in household economic wellbeing,

households whose balance sheets are dominated by primary residence are more volatile to economic shocks. This is because changes in house price movements lead to swings in the value of household net worth (defined as assets less liabilities), also owing to higher leverage of households for whom real estate is the only major asset. In fact, middle-income households suffered larger losses in their wealth in the aftermath of the Great Recession than households at the top of the distribution, owing to harsher debt repayment conditions (Wolff 2014:34). In this context, the size of both unrealised and realised returns to wealth depends on the absolute size of wealth held by a household (Szymborska 2017). Given the institutional structures of the US economy, while balance sheet composition is vital for the trajectory and stability of household relative income, its potentially asymmetric impact across different households is not yet fully understood in the literature.

The analysis in this paper is conducted with the caveat that there is no clear stochastic relationship between balance sheet composition and relative income. Issues of mutual causality in the relationship between income and wealth are highlighted by Piketty (2014) and the subsequent criticism by Naidu (2017). According to Piketty, faster growth rate of the returns to wealth compared to income leads to a rise in the wealth-to-income ratio. This rise causes the capital share and thus inequality to expand under the assumption of a constant rate of return on investment. Naidu (2017) argues that an opposite dynamic is at work because assets are not valued by the amount of savings used for their purchase (as implied by Piketty), but by the future flow of income associated with asset ownership. Higher capital share of income would thus increase wealth (rather than the other way around) due to rising asset values. In this context, the analysis in this paper does not aim to establish any causal relationships as the available data on household finances cannot reconcile the above causality debates. Moreover, because the data is of low frequency and collects information on households' financial situation in isolation from the structural factors in the economy which may be at play, it is difficult to determine the precise independent effects of balance sheet composition on relative income. Instead, the paper investigates differences in the observed empirical regularities between wealth composition and relative position in the income distribution across different households.

The paper is structured as follows. Section 2 describes the method of the empirical analysis in this paper, describing the chosen estimation method and specification. Section 3 presents, and Section 4 discusses results of the non-parametric median slope analysis, looking in detail at the evolution of the estimated effects over time in the course of financial deregulation and innovation, and examining differences in the estimates across the distribution of income and between gender, racial, and intergenerational groups. Section 5 concludes.

2. Method

To evaluate empirically the relationship between household balance sheet composition and position in the income distribution, non-parametric analysis is employed on the U.S. Survey of Consumer Finances (SCF). A Theil-Sen median slope of relative income is estimated, defined as the ratio of household income to the median income in each wave, against variables measuring the composition of asset and portfolio holdings.

2.1. Estimation method

The Theil-Sen median slope is defined as the median of all slopes calculated between each pair of datapoints of any two variables[2] (Theil 1950; Sen 1968). Its interpretation is similar to the regression coefficient as the unit change in the outcome variable given a unit increment in the predictor variable. The difference between non-parametric and regression-based slope is that the non-parametric gradient is based on the calculation of a rank parameter rather than the conditional distribution estimation, and, as such, does not require assumptions about the distribution of the error term (Granato 2006)[3,4].

Given the outcome variable Y, the predictor variable X, and a proportion q$\in$(0,1), the Theil-Sen median slope is defined as β in Equation 1:

$$\theta(Y - \beta X, X) = 1 - 2q \tag{1}$$

where θ is a rank correlation coefficient Somers' D (Somers 1962) and q=0.5. Given the definition of Somers' D *D(Y|X)*, the Theil-Sen median slope satisfies the following property described in Equations 2a-2c:

$$1 - 2(0.5) = D(Y - \beta X|X) \tag{2a}$$

$$0 = \Pr(Y_1 - \beta X_1 < Y_2 - \beta X_2) - \Pr(Y_1 - \beta X_1 > Y_2 - \beta X_2) \tag{2b}$$

$$\Pr[(Y_2 - Y_1)/(X_2 - X_1) < \beta)] = \Pr[(Y_2 - Y_1)/(X_2 - X_1) > \beta)] \tag{2c}$$

[2] The analysis is conducted using STATA package *censlope* developed by Newson (2006).

[3] The alternative parameter which is more commonly used in the rank defining literature is the Spearman correlation coefficient (Spearman 1904). However, it is not suitable to be analysed in the survey data setting, and its confidence intervals are less reliable and interpretable (Kendall/Gibbons 1990). The main difference between the Spearman coefficient and Somers D is that the former is calculated as the product-moment correlation between the cumulative distribution functions of two variables rather than the probabilities of concordance/discordance (see next footnote; Newson 2001).

[4] Given two random variables U and V, Somers' D *D(U|V)* is a conditional probability of concordance or discordance between two ordered pairs of U and V (U_1, U_2) and (V_1,V_2), where $U_1<U_2$ and $V_1<V_2$ (Newson 2001:2). U and V are concordant if the larger of the two values of U is associated with a greater value of V, and they are discordant if the larger U-value is related to a smaller of the two values of V. Similarly to other correlation coefficients *D(U|V)*$\in$(-1,1).

This means that a pairwise slope $(Y_2–Y_1)/(X_2–X_1)$, where $Y_1<Y_2$ and $X_1<X_2$, is equally likely to be above or below β. The Theil-Sen median slope is assumed to follow the t-distribution. Since the size of the cross-section in the SCF is larger than the time series, Theil-Sen slopes are estimated separately for each year of the survey. This provides a clearer insight into the empirical relationship between wealth composition and relative income over time and allows for investigation of these empirical regularities against the backdrop of the changing structure of the US financial sector[5]. The analysis distinguishes conceptually between three periods: 1989-1998, 2001-2007, and 2010-2013. The first period corresponds to the pre-subprime lending years, when growth in the private household debt was rising steadily. The second period is associated with the acceleration of the subprime lending and the corresponding housing bubble. The third period captures the post-crisis conditions, which were marked by the fall of aggregate household debt relative to GDP (source: Federal Reserve Economic Data, St Louis Fed).

The choice of the non-parametric method is motivated by the complex design of SCF, which limits applicability of more advanced econometric techniques. SCF follows a multiply imputed survey structure in order to account for missing values due to nonresponse, which is typical in survey data. Imputation draws from estimations of the conditional probability distribution of the data. Moreover, SCF is not of an equal-probability design, which necessitates inclusion of nonresponse -adjusted probability weights computed from the original selection probabilities. Both of these operations (multiple imputation and nonresponse-adjusted probability weights) complicate the parametric structure of the error term and the covariance-variance relationships assumed by the regression method.

Firstly, there are strong reasons to suspect mutual causality between relative income and wealth composition, as indicated earlier by the Piketty-Naidu debate. In our sample, the correlation between the median income ratio and net wealth is 0.51. When relative income is included as a regressor rather than the dependent variable, its coefficient is statistically different from zero in specifications with balance sheet composition variables on the left-hand side. Non-equal probability design and imputation of missing data, together with the lack of macro-level variables influencing income and wealth distribution, suggest that there are unobserved effects which may be correlated with regressors. For this reason, regression estimates are likely to be biased. However, given the multiply imputed survey structure of the data, it is difficult to meaningfully employ the standard procedures dealing with endogeneity, such as the instrumental variable estimation or generalised method of moments techniques. There are no clear instruments

[5] Note that in the publicly available version of SCF no information on geographical location is disclosed, which prevents analyses of regional inequalities in the USA.

available in the data which would be correlated with balance sheet variables but not independently correlated with relative income.

In addition to the problem of bias posed by endogeneity, efficiency of regression estimators is questioned by the presence of heteroscedasticity and non-normal error distribution. Survey data typically suffer from heteroscedasticity and error terms are frequently not independent (Winship and Radbill 1994). This is because survey data is not typically collected in a random way due to sample clustering and oversampling of certain groups (in SCF, the top tail of the income distribution is oversampled to account for likely non-response among the richest). Bootstrapping of standard errors using replicate weights helps mitigate this problem to a certain extent. However, while assumption that the error term is normally distributed is not strictly required for an unbiased estimator, lack of normality renders statistical inference highly problematic (Wooldridge 2002:126-7). Visual investigation of the residual structure in a regression model and the Shapiro-Wilk W test indicate that in no regression specification are residuals normally distributed. Instead, residuals are heavy-tailed, particularly at the top of the distribution.

Furthermore, OLS estimation method relies on mean averages in calculating the estimates. This makes the estimated coefficients more sensitive to the heavy-tailed distribution of the median income ratio and balance sheet composition. As seen in Table B1 in the Appendix B, these variables tend to have a wide range from highly positive to negative values. In this case, mean averaging in OLS regression may produce estimators which do not reflect the typical relationship between balance sheet composition and relative income.

Overall, regression analysis poses a problem due to substantial noise in the data generated by the multiply-imputed survey structure of the dataset, unobserved effects correlated with regressors, and heavily skewed distribution of income and wealth variables. Nevertheless, regression analysis is valuable in gauging whether balance sheet composition has a statistically significant association with relative income after controlling for household characteristics, which goes unnoticed in the non-parametric estimation. For this reason, regression analysis may provide a rough robustness check on the median slope estimates obtained by the non-parametric method, controlling the estimated effects of wealth composition for other factors influencing the median income ratio. Keeping in mind the above limitations of regression analysis on this dataset, the paper compares performance of a linear regression model with and without balance sheet composition variables, using OLS estimation[6]. The objective of this exercise is to formally test whether inclusion of balance sheet variables produces a significantly better regression model than

[6] To address the problem of sensitivity of OLS estimates to outliers, the dependent variable is censored at the top and bottom 1%.

specification using only household characteristics, using the extra-sum-of-squares F test (explained in more detail in Section 3). Regression analysis is undertaken with a caveat that the magnitude and standard errors of its estimates are less reliable than the non-parametric Theil-Sen median slope, given strong assumptions about the parametric distribution of the error term required by the regression model and non-normal residual distribution[7].

In sum, the Theil-Sen median slope is a preferred method to estimate the empirical regularities between wealth composition and relative income. The Theil-Sen median slope is more robust to outliers as it evaluates the empirical relationship at the median of the distribution of the dependent variable. It also allows to evaluate empirically the association between wealth heterogeneity and relative income without making assumptions about the distribution of the error term, which are inherent in the regression approach and are likely to be violated in the SCF.

2.2. Specification

As mentioned previously, the outcome variable is the median income ratio (interchangeably called relative income), which relates income of a household to the median income for the whole sample in each wave of the survey[8]. To capture the structure of wealth, balance sheet composition variables are presented in terms of their contribution to the total holdings of assets or debt. Balance sheet composition variables include relative shares of financial and non-financial assets in total assets, the shares of secured and unsecured debt in total debt holdings, and leverage measures. Consequently, this specification only includes households with holdings of assets and debt. Table B1 in Appendix B presents descriptive statistics for the variables of interest, while Table B2 shows the correlation matrix.

The contribution of financial assets is broken down into the total asset share of transaction accounts, financial investment assets, and retirement and insurance assets[9]. The share of non-financial assets is decomposed into the contribution of primary residence, other real estate,

[7] In addition to the aforementioned conceptual problems with regression analysis on multiply imputed survey data, there are substantial software limitations which prevent consideration of more advanced econometric techniques dealing with endogeneity and non-normal errors.

[8] Income is composed of wages, capital income (i.e. self-employment, business, and farm ownership income; taxable and non-taxable interest and dividend payments; social security income and withdrawals from retirement accounts excluding defined benefit plans; and realised capital gains or losses), and income from transfers and other sources (such as unemployment benefits, food stamps, child support, alimony payments, and other miscellaneous sources).

[9] Financial investment assets include certificates of deposits, savings bonds, bonds, stocks, other managed assets, pooled investment funds, i.e. non-money market mutual funds, and other financial assets. Retirement and insurance assets include the Individual Retirement Accounts, Keogh accounts, 401(k), and other retirement accounts, as well as the cash value of life insurance plans. Transaction accounts include call, checking, and saving accounts, money market deposit accounts, and money market mutual funds.

business equity, and vehicles and other non-financial assets to total asset holdings[10]. It is expected that greater contribution of other property, business equity, financial investment assets, and retirement and insurance assets to total asset holdings increases the median income ratio. These assets typically yield comparatively higher returns, require large initial down payments, and tend to be concentrated at the top of the distribution (cf. Wolff 2014). In contrast, greater share of primary residence, transaction accounts, and vehicles and other non-financial assets in total holdings is expected to have a decreasing effect on the median income ratio. The balance sheet shares of these assets tend to be the highest among households in the middle and the bottom of the income distribution.

Relationship between debt and relative income is ambiguous. The association can be negative, as debt repayments reduce household income. On the other hand, debt may have a positive impact on the median income ratio, as credit provides an additional source of financing which can be used for consumption and investment. This effect is defined by the composition of debt holdings[11]. The relationship is expected to be positive for the greater share of debt secured by housing in total debt holdings, as it allows for home equity withdrawal and further purchases of assets on which capital income can be earned (Williams 2016). In contrast, greater reliance on unsecured debt in total liabilities is expected to decrease the median income ratio, as this type of debt is predominantly used by low-income households to cover necessary expenses (Pollin 1990; Servon 2018). The estimation distinguishes between relative holdings of mortgage debt (secured by primary residence and by other property), unsecured debt (instalment loans and credit card balances), and other types of debt (other lines of credit and other debt).

Consideration of the impact of household balance sheet composition on relative income calls for analysis of leverage measures, which include the monthly debt-service-to-income ratio (DSY), debt-to-asset ratio, and debt-to-income ratio. Analysis of several leverage indicators reflects different circumstances of indebtedness – for instance, rich households in the dataset have the largest debt-to-income ratios but the smallest ratios of debt to assets. Moreover, while the ratio of debt service to income has been on the decline for all households, the ratio of debt to assets has increased at the bottom of the distribution. Higher debt-service-to-income ratio and debt-to-asset ratio are expected to be negatively associated with the median income ratio as households with high values of these ratios tend to be towards the bottom of the distribution.

[10] Property is defined by the reported market value. Business equity is measured in net terms.

[11] Secured debt is defined as the amount outstanding on mortgages and home equity lines of credit secured by primary residence and by other property. Unsecured debt is measured as credit card balances and instalment loans (which include vehicle, student, and consumer loans). Other debt incudes other unsecured lines of credit and other miscellaneous forms of debt (e.g. debt to family members, borrowing against insurance policies or pension accounts, margin debt, etc.).

Conversely, the debt-to-income ratio is expected to be positively associated with the median income ratio as households at the top of the distribution tend to have higher values of this ratio than the rest.

For each of these balance sheet composition variables, Theil-Sen median slopes are estimated for all waves between 1989 and 2013 individually. The Theil-Sen median slope is first estimated for the whole sample, and then separately for different income groups and across gender, race, and age cohort. The analysis compares households in the bottom 20% and top 10% of the income distribution, female and male households, households headed by Blacks/Latinos to Whites/other ethnicities[12], and households headed by millennials to baby boomers. In the USA, these socio-demographic groups are known to be economically disadvantaged relative to their counterparts, and the task of this analysis is to illuminate the resulting disparities in the impact of the accumulation of specific types of wealth on relative income. It is expected that due to the high opportunity cost of purchasing assets relative to financing everyday consumption, and because of discrimination issues in credit markets associated with the predatory lending practices, these groups were exposed to more costly forms of borrowing and the impact of asset and debt composition on the median income ratio is likely to be different for these households.

In addition to the median slope analysis, the paper evaluates the empirical regularities between wealth composition and relative income when controlling for household characteristics, given the caveats of regression analysis outlined above. Wealth composition variables are included one by one in a regression model in each wave of the survey in order to examine the significance and strength of the relationship when controlling for household characteristics. Equation 3 presents the baseline regression specification. The dependent variable $z_{i,t}$ is the median income ratio of household i in wave t. $X_{i,t}$ is the matrix of regressors for each observation over time, and β is the matrix of estimated coefficients. The error term is denoted by $\varepsilon_{i,t}$.

$$z_{i,t} = X_{i,t}\beta + \varepsilon_{i,t} \qquad t = 1989, 1992, 1995, \ldots, 2013 \qquad (3)$$

Each regression includes a set of controls corresponding to household characteristics. Firstly, age of household head and the value of age squared are included in order to account for the presence of the life-cycle effects. According to the life-cycle theory, an inverted U-shaped relationship is expected between age and the income (Kim 2017). As households engage in consumption smoothing over their life-cycle, they experience the highest levels of relative income during their productive years, declining after retirement. To account for the impact of

[12] Whites include Caucasian, non-Hispanic, and Middle Eastern/Arab respondents. Other ethnicities include Asian, American Indian/Alaska Native, Native Hawaiian/Pacific Islander respondents, and others.

labour market experiences of different household members on household's median income ratio, regression specification controls for the fraction of adults in a household aged between 18 and 35, 36 and 65, and 66 and above. It is expected that a higher proportion of adults aged between 36 and 65 is associated with a higher median income ratio as household members enter their peak productive years, while negative association is expected for the fraction of adults aged 18 to 35 (who are likely to be in higher education or in formative years of their career) and 66 and above (who are likely retired).

Secondly, regression specification controls of human capital accumulation through education, which is measured as the index of the highest educational achievement of all adult household members, ranging from 1 – no grades completed, to 17 – graduate school. Higher educational attainment is expected to improve household's relative income (Sullivan/Smeeding 1997)[13]. The reason for including the total value of educational attainment for adult household members rather than for household head only is to account for characteristics of a spouse and other adults in the household that are pertinent to influencing household's position in the income distribution[14].

Moreover, dummy variables for gender and race are included, equal to 1 for female-headed households and households headed by Blacks or Latinos respectively. It is expected that households headed by females and Blacks or Latinos have lower incomes relative to the median as these households tend to be concentrated at the bottom quintile of the income distribution (U.S. Survey of Consumer Finances). Furthermore, regression specification includes a dummy variable for marital status, equal to 1 if household head is single, and 0 otherwise[15]. Single households are expected to have a lower position in the income distribution relative to the median compared to households who are married or live in a partnership, who benefit from joint income streams (cf. Cohen/Haberfeld 1991).

To control for household size, regression specification includes for the number of financially dependent members of a household. In addition, regression accounts for the number of financially *independent* adults in a household (which may include the spouse in non-single

[13] This is also because relative income is measured at the household level and not at the level of individual earners.

[14] Greenwood *et al*. (2014) find that income inequality is determined by assortative mating. When individuals with similar education levels and financial circumstances are more likely to marry each other, the pool of potential financial resources available to the married household is higher than when choice of spouse is random, owing to higher initial education and income levels of spouses.

[15] While marital status is highly correlated with gender of household head (correlation coefficient of 0.72, see Table B2 in Appendix B), results of the extra-sum-of-squares F test indicate that exclusion of marital status from regression specification leads to a loss of explanatory power by the regression model.

households), in order to control for the effect of a potentially larger pool of earnings on total household income.

Furthermore, regression specification controls for labour market situation of the household. A dummy variable is included equal to 1 if household head is out of labour force, together with a dummy variable equal to 1 if at least one member of the household is unemployed, expecting these households to be further down the distribution of income relative to the median compared to working households[16]. A dummy variable for the type of employment is also included, equal to 1 if the household head is self-employed. The impact of self-employment on the median income ratio is ambiguous. On the one hand, small entrepreneurs have been documented to experience lower income increases than wage-earning households (cf. Hamilton 2000). On the other hand, if self-employed households exercise control over corporations, seize large operational profits, and accumulate sizeable wealth through business equity, they are expected to be positioned at the top of the income distribution relative to the median (Wolff/Zacharias 2013:1383).

To evaluate the relevance of wealth composition as an independent determinant of relative income, the analysis compares specifications including balance sheet variables with a reduced specification including only household characteristics. All specifications are estimated using OLS, which is preferred to panel data estimation techniques commonly used in survey data analysis because the SCF is not a panel but a repeated cross-section. Consequently, fixed and random effects estimators are not applicable in this case. An additional advantage of OLS estimation over these methods is that it accounts for time-invariant variables such as dummies for gender and race, which are excluded from the fixed effects estimation (Wooldridge 2002:170).

3. Results

3.1. Whole sample

Table 1 presents results of the Theil Sen median slope for the whole sample between 1989 and 2013. To gauge the preciseness of the median slope estimates, the analysis examines confidence

[16] The reason for considering labour force participation of only the household head is that it is more likely to affect the financial position of a household than if another household member is out of labour force. In the latter situation, the financial implications may have been factored in the decision of that household member to be out of labour force, as the household has another stable income stream from labour performed by the household head. In contrast, unemployment of any household member is likely to influence household's financial position as it suggests an interruption of a previous income stream for the household.

intervals[17] which are robust to differences in the conditional population distribution of the median income ratio given the different values of the explanatory variables (Newson 2012). Estimates in italics indicate confidence intervals which include zero, and as such are treated as not statistically significant. The remaining estimates are all significant at 5% level according to a t-test on the rank correlation coefficient Somers' D (see Equation 1).

The results show that apart from the relative holdings of vehicles and other non-financial assets, asset composition is positively associated with the median income ratio. The median slope of relative holdings of vehicles and other non-financial assets is estimated to be negative. The estimate increased in absolute terms over time, from -0.32 percentage points in 1989 to -0.6 in 2007, falling to -0.56 in 2010 and reaching -0.61 in 2013.

The median slope of relative holdings of primary residence is positive and statistically significant between 1989 and 2013. A one percentage point rise in the share of primary residence in total assets was associated with a 0.32 percentage point increase in the median income ratio in 1989, falling to 0.18 in 2001, and reaching 0.27 in 2013. A similar magnitude is estimated for the median slope of relative holdings of transaction accounts, which fluctuated over the period. While in 1989 and 1998 the estimate is not statistically significant, a one percentage point increase in the share of transaction accounts in total assets was associated with a 0.42 rise in the median income ratio in 1992, falling to -0.10 in 2001 and rising to 0.33 in 2004. In the aftermath of the Great Recession the estimate fell to 0.12 in 2013.

The largest increases in the median income ratio are obtained for estimates of relative holdings of other real estate, business equity, financial investment assets, and retirement and insurance assets. The median slope of relative holdings of other real estate rose from 2.22 percentage points in 1989 to 3.52 in 2001. After the Great Recession, the estimate fell to 3.03 in 2010, but rebounded to a peak of 3.94 in 2013. The median slope of relative holdings of business equity increased from 2.30 percentage points 1989 to 4.11 in 2007, falling to 3.15 in 2010 and rising thereafter to a peak of 4.18 in 2013. The median slope of relative holdings of financial investment assets was fairly stable at approximately 2.1 percentage points in the pre-subprime period between 1989 and 1998, increasing to 3.38 in 2004 and continuing to rise around the time of the Great Recession after a brief decline to 3.16 in 2007, reaching 4.13 in 2013. In contrast, the

[17] Due to the construction of the *censlope* module, confidence intervals for the Theil-Sen median slope are calculated using the jackknife standard errors. The main difference between jackknife and bootstrap standard errors is that the jackknife procedure is less computationally intensive compared to the bootstrapping technique as it uses less replicates (cf. Schiel 2011).

median slope of relative holdings of retirement and insurance assets fluctuated in the period, falling from a peak of 4.36 percentage points in 1989 to 2.81 in 2013.

The estimates of the median slope of relative holdings of secured debt are positive, while median slopes of relative holdings of unsecured debt tend to be negative. The median income ratio was estimated to rise by 0.81 percentage points in 1989 following a one percentage point increase in the share of mortgages secured by primary residence in total debt. The estimate fluctuated around 0.73-0.85 percentage points between 1992 and 2001, declining in the subprime period to 0.62 in 2010 before reaching 0.76 in 2013. The median slope of relative holdings of mortgages secured by other real estate fell from 2.44 percentage points in 1989 to 1.8 in 1998, rising to a peak of 2.92 in 2007 and falling thereafter to 2.36 in 2013.

The median slope of relative holdings of instalment debt was negative in the period, falling in absolute terms of -0.62 percentage points in 1989 to -0.31 in 2004, rising after the Great Recession to -0.48 in 2013. The estimate of the median slope of relative holdings of credit card debt was positive but close to zero in 1989, turning negative in the following year. It rose in absolute terms from -0.5 in 1992 to a peak of -0.73 in 2001, falling to -0.24 in 2013. The median slope of relative holdings of other types of debt declined from 0.68 percentage points in 1989 to -0.14 in 2001, rising to 0.55 in the following wave before declining to 0.33 in 2010 and reaching 0.67 in 2013.

Among leverage measures, the median slopes of debt-service-to-income ratio, the debt-to-asset ratio, and the debt-to-income ratio are found to be positive in the period. One percentage points increase in the debt-service-to-income ratio was associated with a 141 percentage point rise in the median income ratio in 1989, falling to a low of 88.01 in 2004, rising thereafter to 118.72 in 2013. One percentage point rise in the debt-to-asset ratio was associated with a 48.03 percentage point increase in the median income ratio in 1989, falling to a low of 11.99 in 2013. Similarly, the median slope of debt-to-income ratio declined from 46.31 in 1989 to 14.63 in 2010, rising to 17.41 in 2013.

In sum, households with higher relative holdings of other property, high-yielding financial investment assets, business equity, retirement and insurance assets, and debt secured by other real estate are found to have higher relative income levels in the period studied. The effects were particularly strong in the run up to the Great Recession, and after a brief decline, continued to expand in the years after the crisis. In contrast, incomes of households with higher relative holdings of primary residence, transaction accounts, vehicles, and unsecured debt are estimated to be further away from the median towards the bottom of the distribution. Although the estimated relationship between relative holdings of debt secured by primary residence and the median

income ratio is positive, the effect is lower than for debt secured by other real estate. Moreover, leverage measures were associated with increases in the median income ratio in the period, but the effect declined over time.

3.2. Results by income group

To examine further the relationship between household wealth composition and relative income before and after the Great Recession, the Theil-Sen median slopes are estimated for households in the bottom 20% and in the top 10% of the income distribution. The aim of this analysis is to understand how targeting of subprime borrowers was associated with relative income of these households, and whether development of new financial instruments in the subprime period improved relative income of the richest households.

It is assumed that overlapping confidence intervals imply no statistically significant difference in the median slope between these groups. Table 2 shows that wealth composition has a smaller impact on relative income for households in the bottom quintile of the income distribution compared to households in the top decile, with absolute values of the estimates of asset and debt composition oscillating around 0-0.3 percentage points for the former group. For the poorest 20% of households, the median slope of the share of primary residence in total asset was positive, but not statistically significant in 1989, 1998, 2001, and 2013. In the remaining years, a one percentage point increase in the share of primary residence in total assets was associated with a 0.02-0.03 percentage point rise in the median income ratio. In contrast, the estimate for households in the top decile was negative and increased in absolute terms from -1.66 in 1989 to -2.33 in 2007, reaching -2.05 in 2013.

While for households in the top decile the median slope of the share of other real estate in total asset was positive between 1989 and 2013, the estimates were close to zero or not statistically significant for households in the bottom quintile. For the latter group, the estimate of the median slope of relative holdings of other real estate fell from 0.15 to 0.00 in 2007, rising to 0.09 in 2013. In contrast, the estimate for the top decile increased from 0.76 in 1989 to 2.56 in 2001, declining to 1.38 in 2010 and rising to 1.61 in 2013. Similar patterns are observed for relative holdings of business equity. The median slope of the share of business equity in total assets was not statistically significant for households in the bottom quintile in 2001, 2004, and 2013 and was negative in the remaining years. The estimate fluctuated in the period from -0.12 in 1989 to +0.08 in 1992, falling to -0.08 in 1995 and increasing in absolute terms to -0.23 in 2007, reaching -0.15 in 2010. In contrast, the estimate was positive for households in the top decile, rising from 2.43 in 1989 to 5.85 in 2001, and declining to 3.11 in 2010 before reaching its peak of 6.58 in 2013. Similarly, the median slope of the relative holdings of financial investment assets

was close to zero for households in the bottom quintile, and was not statistically significant in 1995, 2001, 2004, 2010, and 2013. Between 1989 and 2007, the estimate fell from 0.08 to 0.05 percentage points. Conversely, the estimate for households in the top decile was statistically significant in the period, declining initially from 2.86 in 1989 to 1.03 in 2001 before rising to 3.04 in 2013, with a peak of 5.16 in 2007.

For households in the bottom quintile, the median slope of the relative holdings of vehicles and other non-financial assets was close to zero and positive, peaking at 0.04 percentage points in 1998 and reaching 0.02 in 2013. The estimate was not statistically significant in 1989, 2001, 2004, and 2010. In contrast, the estimate was negative for households in the top decile, rising in absolute terms from -7.07 in 1989 to -16.40 in 2013. Similarly, the median slope of relative holdings of transaction accounts was positive for households in the bottom quintile between 1989 and 2013, peaking at 0.02 in 1992 and 1995. Conversely, the estimate was negative between 1992 and 2013 for households in the top decile, rising in absolute terms from -0.55 in 1992 to a peak of -1.59 in 2004. The estimate was not statistically significant in a large number of years for both groups, and the estimates were not statistically different between them in 2001, 2007, 2010, and 2013. The contribution of relative holdings of retirement and insurance assets was positive and close to zero in the period for households in the bottom quintile. In the years when the estimate was statistically significant, it increased from 0.03 in 1995 to 0.1 in 2001 before declining to 0.04 in 2013. For households in the top decile, the estimate was largely negative (with the exception of 1992 when it was positive and 1995 when it was not statistically significant). The estimate declined in absolute terms from -0.53 in 1989 to -1.01 in 2013. The estimates were not statistically different in 1995.

The estimates of the median slopes of relative holdings of secured debt were higher for households in the top decile compared to households in the bottom quintile of the income distribution. For the latter group, the median slope of relative holdings of mortgages secured by main residence was not statistically significant in 1989, 1992, 1998, and 2004, and fluctuated between 0.02 and 0.04 in the remaining years. For households in the top decile, the estimate rose from -0.71 in 1989 to 0.25 in 1998, becoming negative in 2001 and 2004 before returning to positive values after the Great Recession, reaching 0.55 in 2013. In 1992 and 2007 the estimates were not statistically different between both groups. The median slope of relative holdings of debt secured by other real estate for the bottom quintile fluctuated between positive values in 1989, 2001, 2004, and 2013, and negative values in the remaining years, falling overall from 0.14 in 1989 to 0.04 in 2013. For the top decile, the estimate was positive, rising from 1.15 in 1989 to 2.11 in 2007, falling to 0.93 in 2013.

Between 1989 and 2001, the median slope of relative holdings of instalment debt was negative for both groups. The effects were significantly more negative for the top decile. Between 1998 and 2013, the estimate for the bottom quintile fluctuated between -0.03 and -0.02 and was not statistically significant between 1989 and 1995 and in 2004 and 2007. The top decile was increasingly negative in that period (with the highest absolute value of -3.29 in 2007). The median slope of relative holdings of credit card balances was positive for households in the bottom quintile and negative for the top decile between 1989 and 2013. For the former group, the estimate fell from 0.04 in 1989 to 0.02 in 2010 and 2013, while for the top decile the estimate rose in absolute terms from -5.64 in 1989 to -9.34 in 2013 (with the lowest value of -1.91 in 2001). The median slope of relative holdings of other types of debt was not statistically different for both groups in 1995, 2007, and 2013, with the estimate fluctuating between -0.04 and 0.00 for the bottom quintile and between -0.93 and 5.5 for the top decile in these years. In terms of leverage measures, the median slope estimates are found to be consistently negative throughout the period for the top decile, and positive or not statistically significant for the bottom quintile (with the exception of the median slope of the debt-to-income ratio of -0.29 in 1992). While the estimates were close to zero for this group in the majority of the period, the estimate of the debt-service-to-income ratio increased from 3.42 in 1995 to 4.41 in 2004 and reached 3.26 in 2010 after the Great Recession.

In sum, there are marked differences in estimates of wealth composition on relative income across the distribution of income. Households in the top 10% are found to benefit disproportionately from wealth accumulation and from increasing their relative holdings of other property, business equity, financial investment assets, and secured debt compared to households in the bottom 20%. Relative income of the latter group is found to react more to increases in relative holdings of low-yielding assets, unsecured debt, and leverage (particularly in terms of the debt-service-to-income ratio). The subprime period was associated with higher gains in relative income for households in the top decile from increases in relative holdings of financial investment assets and other property, and debt secured by other real estate.

3.3. Results by gender

The primary economic unit (PEU) of SCF is a household, defined as economically dominant single individual or a couple (married or unmarried) over 18 years old, together with all financially dependent individuals. All responses are given by the head of a household, who is taken to be either male in a mixed-sex couple or the older individual in a same-sex couple. This design implies that no information can be inferred about the intra-household distribution of the

analysed variables, and that all female households are either single or in a same-sex relationship. This necessitates that analyses across gender consider the asymmetries in the number of female and male respondents by their marital status. It is common practice to conduct separate analyses of gender differentials for single and non-single households (Doss *et al*. 2008). In SCF, comparison of married female and married male households is highly problematic due to imbalances in the number of observations[18]. For this reason, analysis across gender in this paper is restricted to single households only, as this ensures a more balanced distribution of observations between male and female households.

Table 3 presents results of the Theil Sen median slope estimation for single female and single male households between 1989 and 2013. In the majority of cases, there are significant differences in the estimates across gender over time, particularly so in the run up to the Great Recession. Apart from 2004, the median slope of relative holdings of primary residence was significantly higher for male households than for females. For single female households, the median slope of relative holdings of primary residence increased from 0.09 in 1989 to 0.14 in 2013 and was not statistically significant in 2001. For single male households the estimate declined from 0.46 in 1989 to 0.09 in 2001, rising to 0.24 in 2010 and reaching 0.20 in 2013. Similarly, the median slope of relative holdings of other real estate was significantly lower for single female households than for single male households in 1989, 1992, 1998, and 2007. In the remaining years, the estimate for female households was either higher or not statistically different compared to male households, fluctuating between 0.5 and 1.7 percentage points for female households and between 0.6 and 1.8 for male households. In contrast, the median slope of relative holdings of vehicles and other non-financial assets was significantly higher for female households in the period. The estimate was negative for male households between 1989 and 2013, rising in absolute terms from -0.29 in 1989 to -0.37 in 2004 and 2007, reaching -0.22 in 2013. For female households, the estimate was positive between 1989 and 1998, turning negative thereafter, which led to an overall decline from 0.07 in 1989 to -0.05 in 2010 (the estimate is not statistically significant in 2013).

Business equity is found to have the highest positive association with improvements in the income distribution for single female households. The median slope of relative holdings of business equity tended to be significantly higher for female than for male households in the period, except for 1992 and 2010. The estimate for female households fluctuated between 0.6 and 4.6 for female households and between 0.4 and 1.6 for male households. For both groups the

[18] For instance, in 2013 there were only 205 married female households, compared to 18,640 married male households.

estimate experienced a rise in the subprime period, a fall after the Great Recession, and a rebound in 2013. Moreover, the median slope of relative holdings of transaction accounts was higher for female households than for males in the pre-subprime period in 1989, 1992, and 1998 as well as in 2004 and 2007. The estimate for single female households declined from the values of 0.17 and 0.3 in 1989 and 1992 respectively to 0.08 in 2007 (estimates in 2010 and 2013 are not statistically significant). For single male households, the estimate fluctuated between positive and negative values in the pre-subprime period are stood around zero in the remainder of the period.

In contrast, the median slope of relative holdings of financial investment assets was significantly higher for male households than for female households in all years except for 1989, 2004, 2010, and 2013. After an initial fall in the pre-subprime period, the estimate for female households rose from 0.74 in 1989 to 1.07 in 2004, reaching 0.83 in 2013, while the estimate for male households increased from 0.82 in 1989 to 1.68 in 2007, declining to 0.88 in 2013. Similarly, the median slope of relative holdings of retirement and insurance assets was significantly higher for male households in all years except for 1995 and 2007. The estimate fell from 2.62 in 1989 to 0.86 in 1995 for male households, rising to 1.73 in 2007 and reaching 1.46 in 2013. For female households, the estimate declined from 2.27 in 1989 to 0.98 in 1998 and rose to 1.33 in 2013, with a peak of 1.59 in 2004.

The median slope of relative holdings of debt secured by main residence was significantly higher for male households compared to females in all years other than 1995 and 2013. The median slope of relative holdings of debt secured by main residence fell from 0.51 percentage points in 1989 to 0.28 in 2004 for females, rising to 0.41 in 2007 before falling to 0.36 in 2013. For males, following a brief decline the estimate increased from 0.6 in 1989 to 0.61 in 1998, falling to 0.39 in 2013. Moreover, the median slope of relative holdings of debt secured by other real estate was significantly higher for male households in 1992, 1995, and 2007, and significantly lower than for female households in 2001, 2004, and 2010. The median slope of relative holdings of debt secured by other real estate declined initially from for female households, but it rose from 0.91 in 1989 to 2.02 by 2004, falling thereafter to 1 in 2013. The estimate peaked at 3.28 percentage points in 1992 for male households, reaching 1.06 in 2013. The estimates were not statistically different across both groups in 1989, 1998, and 2013.

The median slope of relative holdings of instalment debt was negative for both groups, with the values significantly more negative for male households in all years. For female households, the estimate declined in absolute terms from -0.24 in 1989 to -0.07 in 2004, reaching -0.20 in 2013. The estimate fell in absolute terms from -0.57 in 1989 to -0.13 in 2001 for males, rising to -0.44 in 2007 and reaching -0.33 in 2013.

Moreover, the median slope of relative holdings of credit card debt was significantly higher for female households in 1992, 1998, 2001, and 2004, being lower from the estimates for males in 1995 and not significantly different in the remaining years. For female households, the median slope of relative holdings of credit card debt declined from 0.16 in 1989 to -0.11 in 2001 and 2004, rising to 0.07 percentage points in 2013. For male households, the estimate was positive in 1989 1995, and 2013, falling from 0.16 in 1989 to -0.32 in 1998 and rising to +0.09 in 2013. The median slope estimates for relative holdings of other types of debt fluctuated between positive and negative values for both groups, with absolute values of less than 0.4 in the period. The estimate was significantly higher for males in 1992, 2004, and 2013, and was significantly higher for female households in 1995, 1998, and 2007. In 1989, 2001, and 2010 the estimates were not statistically different.

The median slope estimates of leverage measures were positive for both groups in the period, with the largest positive contribution coming from increases in debt-service-to-income ratio. The estimate of the debt-service-to-income ratio was significantly higher in absolute terms for male households in all years other than 1992 and 2004, falling from 161.56 in 1989 to 57.9 in 2004 and increasing to 107.9 in 2007 before reaching 77.21 in 2013. For female households, the estimate decreased from 77.67 in 1989 to 67.78 percentage points in 2013. Similar patterns are observed for the median slope of the debt-to-asset ratio, except for 1995 (when the estimates were not statistically different) as well as 1998 and 2013 (when the estimate for males was significantly lower). The estimate for females fell from 17.39 in 1989 to 4.07 in 2013, with a peak of 29.46 in 1992. For males, the estimate decreased over all from 45.11 in 1989 to 2.87 in 2013. Moreover, the median slope of debt-to-income ratio was significantly higher for males in 1989, 1998, 2001, 2007, and 2010, declining from 43.71 in 1989 to 5.17 in 2013. In 1992, 1995, and 2013 the estimate was significantly higher for females, falling from 24.4 in 1989 to 7.94 in 2013.

In sum, the most substantial differences in the estimates in favour of male households are observed for relative holdings of primary residence, financial investment assets, retirement and insurance assets, transaction accounts in the subprime and post-crisis period, and debt secured by main residence. Conversely, higher estimates of business equity for female households indicate that greater relative holdings of this asset are more conducive to gains in relative income and thus potential reductions in gender income inequality, although, together with relative holdings of debt secured by other property, the positive impact of these types of wealth became weaker after the Great Recession.

3.4. Results by race

Subprime lending expansion in the early 2000s had a strong racial dimension, as minority households were targeted by subprime lenders. The following analysis aims to gauge the differences in the impact of wealth composition on relative income across race in the context of this predatory inclusion of minority households into the financial system. Table 4 presents estimation results of the Theil-Sen median slope across race, comparing households headed by Whites or other ethnic groups to households headed by Blacks or Latinos[19].

The median slope of relative holdings of primary residence was significantly lower for Black and Latino households in 1989 and 1992, and significantly higher for this group than for Whites/other ethnic groups in 1995, 2001, and between 2007 and 2013. One percentage point increase in the share of primary residence in total assets was associated with a 0.13 percentage point decline in the median income ratio for Black/Latino households in 1989. The estimate increased to 0.33 and 0.36 respectively in 2001 and 2007, before reaching 0.08 in 2013 after the Great Recession. For White/other ethnicity households, the estimate fell from 0.33 in 1989 to 0.11 in 2013, with a low of 0.05 in 2001.

Moreover, until 2001, the median slope of relative holdings of vehicles and other non-financial asset was significantly higher and positive for Black/Latino households, and negative for White/other ethnicity households. Between 2001 and 2013, the estimate was negative for both groups, taking more negative values for Whites/other households. One percentage point rise in the share of this asset in total asset holdings was associated with a 0.03 percentage point rise and a -0.44 fall in the median income ratio for Blacks/Latinos and Whites/others respectively in 1992. The estimate rose to 0.11 in 1995 for the former group and declined to -0.1 in 2013, with a low of -0.21 in 2007. For Whites/other households, the estimate increased in absolute terms from -0.44 in 1989 to -0.93 in 2013.

In contrast, the median slope of relative holdings of other real estate was significantly higher for White/other ethnicity households in all years except for 2001 (when the estimate for Black/Latino households was higher). The estimate for this group rose from 2.14 in 1989 to 3.53 in 2004, and fell to 2.97 in 2010 after the Great Recession before rising to a peak of 4.03 in 2013. For Black/Latino households, one percentage point increase in the share of other real estate in total assets was associated with a 1.66 percentage point rise in the median income ratio in 1989, rising to a peak of 3.8 in 2001 and falling to 1.99 in 2013. Similarly, the median slope of relative

[19] Categorisation of racial groups is motivated by their availability in the dataset and similar patterns of wealth accumulation between 1989-2013 for household headed by Blacks and Latinos vs. households headed by Whites and other ethnic groups (source: U.S. Survey of Consumer Finances, cf. Williams 2016).

holdings of retirement and insurance assets was significantly higher for Whites/other ethnicities in the whole period apart from 1989 (when the estimates were not statistically different). However, the estimate for this group declined from 4.03 in 1989 to 2.93 in 2013, rising temporarily to 3.51 in 2004. For Blacks/Latinos, the value of the estimate also decreased in the period, falling from 3.87 in 1989 to a low of 0.89 in 1995, increasing to 2.52 in 2007 before reaching 1.47 in 2013.

The picture is less clear-cut for other assets. The median slope of relative holdings of business equity was not statistically different across both groups in 2001. In 1989 and 1998, the estimate was significantly higher for Blacks/Latinos, while it was significantly lower for this group in the remaining years, with disparities rising in the period before and after the Great Recession. The median slope increased from 4.10 to 5.66 for Blacks/Latinos between 1989 and 1998, falling to 1.72 in 2010 before reaching 2.02 in 2013. For Whites/other households, the estimate fluctuated between 2.09 in 1989 and 4.22 in 2007, falling to 3.09 in 2010 before peaking at 4.54 in 2013. Moreover, the median slope of relative holdings of financial investment assets was significantly higher for Blacks/Latinos between 1989 and 2010. After the Great Recession, in 2013, the estimate became significantly higher for Whites/other ethnicity households. For Blacks/Latinos, the value of the median slope declined between 1989 and 1995 from 4.95 to 2.48, rising to a peak of 8.56 in 2007 and falling to 2.14 in 2013. For Whites/other ethnicities, the estimate increased from 1.41 in 1989 to 2.48 in 2004, rising after the Great Recession to 3.6 in 2013.

Similarly, between 1989 and 2007, the median slope of relative holdings of transaction accounts was significantly higher for Blacks/Latinos. After the Great Recession, in 2010 and 2013, the estimates were significantly higher for Whites/other ethnicities. The median slope for Blacks/Latinos declined from 1.22 in 1989 to 0 in 2001, rising briefly to 0.34 in 2004 before falling to 0 in 2013. In contrast, the estimate increased for Whites/other ethnicities from -0.22 in 1989 to 0.16 in 1995, falling to approximately -0.2 in 1998 and 2001 before increasing to 0.26 in 2013.

In terms of debt, the median slope of relative holdings of mortgages secured by main residence was significantly lower for Blacks/Latinos in the period, falling from 0.57 in 1989 to 0.47 in 2013, with a brief increase to 0.61 in 2007. For Whites/other ethnicities, the estimate increased from 0.81 in 1989 to 0.85 in 2001, falling to 0.76 in 2013, with a low of 0.64 in 2010 after the Great Recession. Furthermore, Black/Latino households experienced higher increases in the median income ratio from a one percentage point rise in the share of debt secured by other property in 1989, 1992, and 2001. In 1998, the difference across race was not statistically

significant, with higher estimate for Whites/other ethnicities in the remaining years. For that group, the median slope declined initially from 2.09 in 1989 to 1.77 in 1998, rising to 3.44 in 2007 before falling to 2.5 in 2013. The estimate for Blacks/Latinos fluctuated between 1989 and 2001, falling from 3.58 in 1989 to 1.23 in 2013, with temporary increases to 4.2 in 1992, 2.89 in 2001, and 2.08 in 2010.

The median slope of relative holdings of instalment debt was negative for both groups over the period. It was significantly less negative for Black/Latino households, declining in absolute terms from -0.39 in 1989 to -0.08 in 2001 and reaching -0.26 in 2013. For Whites/other ethnicities, the estimate fell in absolute terms from -0.65 in 1989 to -0.36 in 2004, rising to -0.5 in 2013. Similarly, the median slope of relative holdings of credit card debt was significantly higher and positive for Black/Latino households in all years except for 2001 and 2004, and negative for Whites/other ethnicities. For the former group, the estimate fell from 0.51 in 1989 to -0.11 in 2001, rising to 0.28 in 2013. For Whites/other ethnicities, the median slope rose in absolute terms from -0.24 in 1989 to -0.94 in 2001, reaching -0.57 in 2013. Moreover, the median slope of relative holdings of other debt were not significantly different across race in 2001. In 1992 and 2007, the estimate was significantly higher for Blacks/Latinos compared to Whites/other ethnicities. For the former, the median slope fell from 0.37 in 1989 to -0.24 in 1995, reaching 0.07 in 2013. After an initial decline, the estimate rose for Whites/other ethnicities from 0.61 in 1989 to 1.04 in 1998, fluctuating between positive and negative values until reaching 1.29 in 2013.

Moreover, the median slope of debt-service-to-income ratio was significantly higher and positive for Blacks/Latinos in all years except for 1995. The estimate declined from 153.08 in 1989 to 91.61 in 2004, rising to 129.83 in 2013. For Whites/other ethnicities the median slope decreased from 125.93 in 1989 to 74.47 in 2004, reaching 96.67 in 2013. Similarly, apart from 1995 and 1998 the median slope of debt-to-income ratio was significantly higher for Blacks/Latinos in the period, falling from 47.33 to 16.72 between 1989 and 2013. For Whites/other ethnicities the estimate decreased from 42.27 in 1989 to 11.64 in 2010, rising to 15.61 in 2013. The median slope estimate for debt-to-asset ratio was significantly higher for Blacks/Latinos in 2001, 2004, and 2007, and significantly lower for this group compared to White/other ethnicity households in 1989, 1992, 1995, and 2013. For the former group, the estimate fell from 40.52 in 1989 to 13.28 in 2013, while for Whites/other ethnicities it declined from 50.07 in 1989 to 14.74 in 2013, with a low of 11.33 in 2010.

In sum, relative incomes of Black and Latino households benefited to a smaller extent from greater relative holdings of other real estate, retirement and insurance assets, mortgages secured

by main residence, and business equity since the subprime period compared to White/other ethnicity households. Black and Latino households are found to rely comparatively more on relative holdings of vehicles, credit card debt, financial investment assets prior to 2013, and higher leverage in improving their position in the income distribution compared to Whites/other ethnicities. Higher gains from relative holdings of primary residence for Blacks and Latinos indicate that rising homeownership rates among these groups was associated with higher gains in relative income, revealing a potential source of reducing racial income inequality.

3.5.Results by cohort

The Great Recession brought intergenerational differences in the standards of living to the forefront of public debate. The generation of millennials[20] has reportedly faced worse income and wealth accumulation prospects compared to baby boomers[21], driven by different institutional and policy context in which each generation has grown up (Taylor and Pew Research Center 2016). Baby boomers grew up in the Golden Age of economic development in the USA, benefiting from stable employment in the booming manufacturing sector under the New Deal, more generous welfare state, cheaper education, and lower costs of living. Conversely, millennials grew up in the period of deregulated labour markets and rising living costs due to privatisation of public services, and many of them have entered the labour force at the time of the Great Recession (Chauvel and Schröder 2014). These experiences led to lower income and net wealth among this group compared to baby boomers (Bialik and Fry 2019). Nevertheless, some argue that these intergenerational differences are reflective of the more dominant class-based inequalities (Christophers 2017).

Millennials were also a target of subprime lenders before the Great Recession. In this context, this paper examines whether there are differences in the impact of wealth composition on relative income across generations. Synthetic cohorts are constructed, distinguishing between households headed by baby boomers (born between 1946 and 1964) and households headed by

[20] The definition of millennials is vaguer than of baby boomers, and ranges from those born in 1980-1982 to 1996-1997 and even the early 2000s depending on the chosen frame of reference (Dimock 2019).
[21] Baby boomers are defined by the U.S. Census as those born between 1946 and 1964 (Hogan, Perez, and Bell 2008).

millennials (born between 1980 and 1995[22]). Table 5 shows the Theil-Sen median slope results across these two groups between 2001 and 2013[23].

The estimated relationships between balance sheet composition and position in the income distribution are significantly different between baby boomers and millennials in all years. Millennials tend to observe smaller improvements in relative income compared to baby boomers, particularly in terms of relative holdings of other real estate, business equity, financial investment assets, transaction accounts, and retirement and insurance assets. The median slope of relative holdings of other real estate exceeded 3.7 percentage points for baby boomers between 2001 and 2013, rising from 4.37 in 2001 to 4.64 in 2010 and reaching 4.3 in 2013. After an initial fall, the estimate for millennials increased from 1.46 to 1.99 in that period. Similarly, the median slope of relative holdings of retirement and insurance assets also increased over time for millennials, from 0.2 in 2001 to 2.47 in 2013, with a peak of 3.55 in 2004 when the estimate was not significantly different from that of baby boomers. For baby boomers, the estimate rose from 2.33 in 2001 to 2.55 in 2013, with the highest value of 2.92 in 2004.

The largest difference in estimates is observed for the median slope of relative holdings of financial investment assets. The estimate for baby boomers stood at 5.98 in 2001, increasing to 8.5 in 2007 before reaching 6.59 in 2013. For millennials, the estimate was at just 0.79 in 2001, falling to -0.14 in 2004 and rising to 1.17 by 2013. Similarly, the median slope of relative holdings of business equity increased for baby boomers from 3.20 in 2001 to 4.05 in 2013, with a peak of 4.53 in 2010. For millennials, the estimate decreased initially from 1.09 in 2001 to 0 in 2004, rising thereafter to 1.68 in 2013. For relative holdings of transaction accounts, the median slope estimate for baby boomers increased from 0.88 in 2001 to 3.96 in 2007, falling to 1.27 in 2013. Meanwhile, the estimate for millennials was largely negative in that period, declining from 0 in 2001 to -0.19 in 2013.

In contrast, the median slope of relative holdings of primary residence was significantly higher for millennials compared to baby boomers between 2001 and 2013. One percentage point increase in the share of primary residence in total assets was associated with a 0.47 rise in the median income ratio for millennials in 2001, and this effect increased throughout the Great Recession to 0.76 in 2013. Conversely, the estimate for baby boomers stood at 0.3 in 2001 but in the remaining years it was not statistically different from zero. Moreover, the median slope of

[22] The lower bound is given by the observation that the youngest respondents aged 18 or over in the 2013 survey had to be born in 1995 or earlier.

[23] While millennials appear in the sample since the 1998 survey (when they were 18 years old at the upper bound), in 1998 the number of observations across millennials and baby boomers is highly unbalanced (70 vs. 8,949), and so the analysis begins in 2001.

relative holdings of vehicles and other non-financial assets was negative for both groups between 2001 and 2013. The estimate was less negative for millennials compared to baby boomers, rising in absolute terms from -0.06 percentage points in 2004 to -0.36 in 2013 for the former group and falling from -1.49 in 2001 to -1.28 in 2013 for baby boomers.

The estimates of relative holdings of secured debt are generally higher for baby boomers than for millennials. The median slope of relative holdings of mortgages secured by main residence fluctuated between 0.9 in 2001 and 0.63 in 2010 for baby boomers, reaching 0.7 in 2013. For millennials, the estimate increased from 0.33 in 2001 to 0.88 in 2013. In contrast to the previous years, the median slope was significantly higher for millennials than for baby boomers in 2010 and 2013. Moreover, the median slope of relative holdings of debt secured by other real estate was consistently higher for baby boomers in the period, as the estimate increased from 2.41 in 2001 to 3.24 in 2010, reaching 2.32 in 2013. After an initial fall, the estimate for millennials rose from 1.3 in 2001 to 1.45 in 2010, but declined to 1.18 in 2013. Among unsecured debt, the median slope of relative holdings of instalment debt was negative for both groups in the period, with less negative values observed for millennials in all years apart from 2013. The estimate stood at -0.48 for baby boomers in 2001, falling in absolute terms to -0.47 in 2013, with the highest absolute value of -0.54 in 2007. For millennials, the estimate declined from 0 in 2001 to -0.59 in 2013. Moreover, a one percentage point rise in the share of credit card debt in total debt was associated with a -1.08 percentage point *decline* in the median income ratio for baby boomers in 2001 and a 0.08 percentage point *increase* for millennials. The estimate fell in absolute terms for the baby boomers, from -1.07 in 2004 to -0.47 in 2010, reaching -0.65 in 2013. For millennials the estimate turned negative at -0.28 in 2007 but increased to +0.28 by 2013. Lastly, the median slope of relative holdings of other types of debt was significantly higher for baby boomers in all years except for 2001, when estimates were not significantly different, and 2007, when the estimate was higher for millennials. For both groups, the magnitudes of the estimates in the period were less than 1 percentage point.

In terms of leverage measures, the estimates tend to be significantly lower for baby boomers than for millennials. For baby boomers, the median slope of debt-service-to-income ratio decreased initially from 24.08 in 2001 (when the difference between groups was not statistically significant) to 0 in 2007, reaching 49.3 in 2013. The median slope of debt-to-asset ratio for this group increased in absolute terms from -0.17 to -0.84 between 2001 and 2004, becoming positive thereafter and reaching 9.41 in 2013. The estimate for the debt-to-income ratio for baby boomers fell from 17.3 in 2001 to 9.46 in 2007, rising to 14.29 in 2013. For millennials, the median slope of debt-service-to-income ratio increased consistently over time, from 26.61 in

2001 to 167.88 in 2013. The estimate of the debt-to-income ratio rose from 4.85 in 2001 to 15.12 in 2007, falling to 13.67 in 2013. Similarly, the median slope of the debt-to-asset ratio increased initially from 3.48 in 2001 to 5.61 in 2007 and decreased to 1.91 in 2013.

In sum, millennials are found to experience lower gains in relative income compared to baby boomers from relative accumulation of financial investment assets, other property, business equity, transaction accounts, retirement and insurance assets, as well as mortgages secured by other real estate and by main residence until 2010. In turn, relative income of millennials tends to improve to a larger extent than for baby boomers from increasing relative holdings of credit card debt, leverage, and main residence. Higher relative gains from relative holdings of primary residence found for millennials suggests a potential source of reducing intergenerational income inequality through increases in homeownership among this group.

3.6. Regression analysis

The previous analysis undertook a non-parametric evaluation of the empirical regularities between wealth composition and relative income, examining differences between different household groups. A limitation of this analysis is that it does not consider how the empirical relationship holds when controlling for the potential impact of household characteristics on relative income. To this end, the following analysis uses the extra sum-of-squares F-test to compare performance of a regression specification including only household controls with specifications including controls and balance sheet variables, as described in Section 2.

The extra sum-of-squares F-test evaluates which of two nested regression models is preferred. In the present case, regression specification including controls only is nested in the extended specifications including balance sheet variables. The F-test estimates the relative increase in the sum of squared errors in the reduced regression specification (with controls only) and compares it to the relative gain in the degrees of freedom. The null hypothesis of the F-test is that the reduced model without balance sheet variables is superior to the extended specification as the additional regressor in the extended model does not lead to a significant decrease in the error sum of squares. The obtained F statistic is shown in Equation 4, where SS_1 and DF_1 are the sum-of-squares and the degrees of freedom of the reduced model with controls only, and SS_2 and DF_2 are the respective statistics of the extended specifications including balance sheet variables. The resulting F statistic is compared to the critical values of F distribution to determine rejection of the null hypothesis.

$$F = \frac{(SS_1 - SS_2)/(DF_1 - DF_2)}{SS_2/DF_2} \quad (4)$$

Table 6 shows that according to the results of the extra sum-of-squares F-test, in the vast majority of cases inclusion of balance sheet variables leads to statistically significant reduction in the error sum of squares, indicating that the extended specifications perform better than the reduced model. Exceptions (marked in italics) include the extended regression including the relative holdings of primary residence in 1989, relative holdings of other types of debt in 1992, 1995, 2001, 2004, and 2013, as well as the debt-to-asset ratio in 2001 and 2007. In these cases, the estimated coefficients of these balance sheet variables are not statistically different from zero at 5% level (as shown in Table B3 in Appendix B).

As an additional insight into the relative performance of regression specifications including balance sheet variables, Table 6 reports the RMSE and adjusted R^2 of the respective regressions. The adjusted R^2 indicates that the proposed specifications explain between 30% and 40% of variation in the median income ratio over time. The differences in the adjusted R^2 upon inclusion of balance sheet variables are minimal – in the majority of cases, the statistic doesn't change or changes by +/- 0.01. Generally, inclusion of balance sheet variables increases the value of adjusted R^2 in the case of relative asset holdings and leverage measures from 2004 onwards. The gains are the largest when regression includes relative holdings of vehicles and other non-financial assets, mortgages secured by other property, the debt-service-to-income ratio or the debt-to-income ratio. Low R^2 is expected in survey data given the large sample size, but it may signal omitted variable problems, which is confirmed by rejection of null hypothesis of no omitted variables in the Ramsey RESET test. For this reason, results also compare the Root Mean Squared Error (RMSE), which takes a square root of the ratio of the residual sum of squares in the regression to its degrees of freedom. Marginally lower values are obtained for the reduced regression in all years, with the exception of specifications including the debt-service-to-income ratio or the debt-to-income ratio.

In sum, these findings suggest that household wealth composition significantly affects position in the income distribution relative to the median, and thus needs to be considered as an independent factor shaping income inequality. Nevertheless, the regression analysis suffers from major specification and estimation problems owing to the multiply imputed survey design of the data and insufficient information on macroeconomic determinants of income, as outlined in Section 2. In addition to the potential omitted variable bias, a further limitation of regression analysis arises due to the endogeneity issues associated with the interplay between income and wealth, and the non-normal and heteroscedastic error structure. For this reason, the reported regression exercise should be treated as an illustration of the statistical significance of the relationship between household wealth composition and relative income when controlling for

household characteristics, rather than estimation of any causal relationship or magnitude of the analysed effects.

4. Discussion

Results of the above analysis reveal a source of income inequality associated with the structure of household wealth, as balance sheet composition is found to be associated with differential gains in relative income depending on the type of assets and debt owned. These differences are pronounced across the analysed distributional and age groups, and some tend to be weaker for households headed by single women and Blacks/Latinos. Households in the poorest quintile of the income distribution are found to have experienced smaller gains, or even losses, in relative income from asset and debt ownership than households in the top decile and they were more reliant on comparatively more expensive unsecured debt holdings in improving their relative position in the income distribution.

Furthermore, there are marked intertemporal patterns in the strength of these gains in the context of subprime lending expansion, rising household indebtedness and leverage, and proliferation of new profitable financial instruments based on loans to vulnerable households since the 1980s. Greater share of primary residence in total assets diminished its positive association over relative income in the subprime period, which was only partially restored after the Great Recession. This was paralleled by a decreasing impact of relative holdings of transaction accounts, and increasingly negative estimate of vehicles and other non-financial assets over time. These types of assets are held more widely across the income distribution but contributed less and less to improvements in relative incomes in the period studied. Moreover, the subprime period was associated with higher estimates of relative holdings of business equity and debt secured by other property for Whites/other ethnicities, and with rising effects of leverage and declining contributions of relative holdings of transaction accounts to relative income of millennials. In addition, after the Great Recession, some gains in relative income thanks to increases in relative holdings of financial investment assets, business equity, and secured debt were reduced for Black/Latino households.

The biggest gains in relative income are observed for relative holdings of assets which are owned by a smaller portion of households, namely business equity, other property, retirement and insurance assets, and financial investment assets. The increase in their magnitudes after the Great Recession signifies that households holding a larger part of their wealth in these assets had the opportunity to recover faster from financial losses incurred due to the crisis than households

whose asset holdings rely on primary residence and low-yielding assets such as vehicles and transaction accounts. Moreover, these effects tend to be lower for households in the bottom quintile of income distribution, millennials, Blacks/Latinos (except for financial investment assets prior to 2013), and single female households (except for business equity before the Great Recession).

Differences in the estimates across secured and unsecured debt confirm what has been previously discussed in the literature, namely that the type of debt held matters for financial wellbeing. As unsecured debt is held more widely among low-income households, it does not provide benefits for asset purchases and refinancing presented by relatively higher secured debt holdings. The fall in the absolute magnitudes of the estimates of relative holdings of unsecured debt before the Great Recession for the whole sample, single females, and Blacks/Latinos, and after the crisis for households in the bottom quintile suggests that this type of debt became less detrimental to households' relative income in the subprime period. Simultaneously, households in the bottom quintile of income distribution, as well as those headed by single women, Blacks/Latinos, and millennials experienced consistently lower gains in relative income from increasing their relative holdings of mortgage debt compared to their counterparts.

Furthermore, the fairly consistent value of the estimates of relative holdings of debt secured by main residence in the whole sample indicate that households with higher proportion of liabilities held in this type of debt enjoyed more resilient source of additional financing benefitting their relative income than household relying on unsecured debt. The spike in the value of the Theil-Sen slope of relative holdings of debt secured by other property in the subprime period suggest that developments in the housing market at that time were particularly favourable to borrowers owning multiple properties. Simultaneously, higher magnitudes of this estimate indicate that households owning more of this type of debt benefitted from greater additional sources of financing than households whose debt holdings are dominated by debt secured by main residence.

Similarly, differential gains in relative income following incremental increases in leverage signal that for some household rising indebtedness is a vehicle of improving their position in the income distribution. Relative incomes of households in the bottom 20% of income distribution, millennials, and Black/Latino households are found to rely more on increases in leverage compared to households in the top 10%, baby boomers, and Whites/other ethnicities. These households may be particularly vulnerable to potential increases in interest rates after the Great Recession as debt repayments become costlier, while their ability to draw on leverage to improve

their position in the income distribution may be limited if household lending becomes more regulated.

Higher estimates of relative holdings of primary residence for Black/Latinos and millennial households, together with increasing magnitude of these estimates for single female households, suggest that widening access to homeownership is an important avenue for reducing racial, intergenerational, and gender income inequality. While estimates of business equity and financial investment assets tend to be significantly higher for female and Black/Latino households respectively relative to their counterparts, the ownership rates for these types of assets within these groups are very narrow compared to homeownership (see U.S. Survey of Consumer Finances). Simultaneously, lower estimates of relative holdings of mortgages secured by main residence for female and Black/Latino households, and for millennial households until 2007, suggest that widening of homeownership should not be delegated solely to the private financial sector.

In sum, the analysis reveals significant differences in the established empirical regularities between wealth composition and income across households and over time, in the context of institutional changes before and after the Great Recession. Heterogeneity of the estimated effects provides a more detailed insight into the social implication of households' engagement with modern financial markets. The analysis suggests that policies aiming to further households' integration into financial markets have to reckon with existing institutional structures to avoid perpetuating inequality by relying on universal remedies delivered by profit-driven private markets.

5. Conclusion

This paper investigated the patterns of empirical regularities between wealth composition and income inequality across households, proxied by households' relative position in the income distribution. Using nine waves of the U.S. Survey of Consumer Finances between 1989 and 2013, the paper analysed the non-parametric Theil-Sen median slope of asset and debt composition and leverage measures versus relative income of US households, paying attention to changes in these effects for different household groups and over time in light of institutional changes in the US financial sector since the 1980s. The findings show that households experience differential gains in relative income depending on how their wealth is allocated between different types of assets and debt. Pronounced differences in the estimated empirical regularities were observed between households in the bottom 20% and the top 10% of income distribution and between millennials and baby boomers, particularly in terms of relative holdings of high-yielding assets including

property other than main residence, business equity, financial investment assets, and retirement and insurance assets, and of mortgages. Significant differences were also found for certain asset and debt holdings across single female and male households and between households headed by Blacks/Latinos and by Whites/other ethnicities.

The estimated empirical regularities have seen substantial changes over time against the backdrop of institutional transformation of the US financial sector since the 1980s. The decreasing impact of relative housing wealth on relative income around the subprime period was paralleled by extension of subprime lending to vulnerable households in the early 2000s. Simultaneously, gains in relative income associated with relative holdings of primary residence and transaction accounts have not rebounded to their pre-recession levels. Conversely, relative incomes of households with greater amount of wealth held in high-yielding assets and secured debt have experienced faster recovery in terms of gains in relative income following the Great Recession. This suggests that the empirical regularities between wealth composition and households' position in the income distribution are not indifferent to institutional and structural factors in the US economy, although no precise causal channels can be established empirically with the available data.

The analysis also revealed balance sheet composition as a significant independent determinant of households' relative position in the income distribution when controlling for household characteristics. Recent literature has highlighted the interactions between income and wealth as an important driver of inequality. The main contribution of this paper is to use existing estimation methods in a new way to illuminate the empirical interactions between relative income and different types of wealth, which have been so far analysed at the aggregate level. However, data limitations giving rise to endogeneity, omitted variable bias, and non-spherical residuals poses problems to the consistency and unbiasedness of regression estimates, rendering non-parametric estimation more suitable to analyse the empirical regularities between wealth composition and relative income. As such, this paper does not aim to resolve the causal debates between income and wealth highlighted by Piketty (2014) and Naidu (2017). Overall, the paper carries policy implications for policymakers in the USA and globally, cautioning against inequality-reducing policies which rely on profit-oriented markets to promote wealth accumulation and increases in income, without paying attention to the institutional conditions shaping the stability of finances and access to higher-yielding forms of wealth for different households.

Declarations of interest: none

Acknowledgments: I am grateful two anonymous reviewers for their invaluable comments, as well as Prof Gary Dymski, Prof Giuseppe Fontana, and Dr Peter Phelps for their feedback and support on the PhD research on which this paper is based. I would like to thank Prof Özlem Onaran, Dr Cem Oyvat, Dr Marco Passarella Veronese, Prof Engelbert Stockhammer, Prof Jan Toporowski and Dr Rafael Wildauer for their feedback on an earlier draft of this paper.

References

Barba, A. and Pivetti, M. 2009. "Rising household debt: Its causes and macroeconomic implications — a long-period analysis", *Cambridge Journal of Economics*, vol. 33, pp. 113-137.

Bialik, K., and Fry, R. 2019. "Millennial life: How young adulthood today compares with prior generations". Pew Research Center. Available at: http://www.pewsocialtrends.org/essay/millennial-life-how-young-adulthood-today-compares-with-prior-generations/ (Accessed: 22th February 2019).

Chauvel, L., and Schröder, M. 2014. "Generational Inequalities and Welfare Regimes", *Social Forces*, vol. 92, no. 4, pp. 1259-1283.

Christophers, B. 2017. "Intergenerational Inequality? Labour, Capital, and Housing Through the Ages", *Antipode*, vol. 50, no. 1, pp. 101-121.

Cohen, Y., and Haberfeld, Y. 1991. "Why Do Married Men Earn More than Unmarried Men?", *Social Science Research*, vol. 20, pp. 29-44.

Dimock, M. 2019. "Defining generations: Where Millennials end and Generation Z begins", Pew Research Center. Available at: http://www.pewresearch.org/fact-tank/2019/01/17/where-millennials-end-and-generation-z-begins/ (Accessed: 22th February 2019).

Doss, C., Grown, C., and Deere, C.D. 2008. *Gender And Asset Ownership: A Guide To Collecting Individual-Level Data*, Policy Research Working Papers, The World Bank. https://doi.org/10.1596/1813-9450-4704.

Dos Santos, P.L. 2009. "At the Heart of the Matter: Household Debt in Contemporary Banking and the International Crisis", Research on Money and Finance Discussion Paper no 11.

Federal Reserve Economic Data, St. Louis Fed. Available at: https://fred.stlouisfed.org (Accessed 16th August 2018).

Fontana, G., Rodriguez-Gil, A., and Sawyer, M. 2014. "The Macroeconomic Analysis of Financialisation and Wage Inequalities", mimeo.

Goda, T., and Lysandrou, P. 2013. "The Contribution of Wealth Concentration to the Subprime Crisis: A Quantitative Estimation", *Cambridge Journal of Economics*, vol. 38, no. 2, pp. 301-27.

Granato, G.E. 2006. "Kendall-Theil Robust Line (KTRLine—version 1.0) – A visual basic program for calculating and graphing robust nonparametric estimates of linear-regression coefficients between two continuous variables". In: *Techniques and Methods of the U.S. Geological Survey*, Book 4, pp. 1-31.

Greenwood, J., Guner, N., Kocharkov, G., and Santos, C. 2014. "Marry Your Like: Assortative Mating and Income Inequality". Working Paper No. 19829. Cambridge, MA: National Bureau of Economic Research. Available at: https://www.nber.org/papers/w19829.pdf (Accessed 26th February 2019).

Hamilton, B.H. 2000. "Does Entrepreneurship Pay? An Empirical Analysis of the Returns to Self-Employment", *Journal of Political Economy*, vol. 108, pp. 604-631.

Henry, B., Reese, J., and Torres, A. 2013. *Wasted Wealth. How the Wall Street Crash Continues to Stall Economic Recovery and Deepen Racial Inequity in America*, Alliance for a Just Society.

Hogan, H., Perez, D., and Bell, W.B. 2008. "Who (Really) Are the First Baby Boomers?", *Joint Statistical Meetings Proceedings*, Social Statistics Section, Alexandria, VA: American Statistical Association, pp. 1009–1016.

Karacimen, E. 2013. "Dynamics behind the Rise in Household Debt in Advanced Capitalist Countries: An Overview", FESSUD Working Paper Series No. 9.

Kendall, M.G., and Gibbons, J.D. 1990. *Rank Correlation Methods*, 5th edition, London, Griffin.

Kim, Y.H. 2017. "The permanent income hypothesis, transitional dynamics, and excess sensitivity of consumption", *Structural Change and Economic Dynamics*, vol. 40, pp. 10-25.

Levin, E., Greer, J., and Rademacher, I. 2014. "From Upside Down to Right-Side Up. Redeploying $540 billion in federal spending to help all families save, invest, and build wealth", Corporation for Enterprise and Development Report.

Mian, A., and Sufi, A. 2013. *House of Debt*, Chicago, University of Chicago Press.

Naidu, S. 2017. "A Political Economy Take on W/Y". In: Boushey, H., DeLong, B., and Steinbaum, M. (eds.) *After Piketty. The Agenda for Economics and Inequality*, Harvard, Harvard University Press.

Newson, R. 2001. "Parameters behind 'non-parametric' statistics: Kendall's τa, Somers' D and median differences", *The Stata Journal*, vol. 1, no. 1, pp. 1–20.

Newson, R. 2006. "Confidence intervals for rank statistics: Percentile slopes, differences, and ratios", *The Stata Journal*, vol. 6, no. 4, pp. 497–520.

Newson, R. 2012. "Robust confidence intervals for median (and other percentile) slopes", Stata Technical Bulletin. Available at: http://www.imperial.ac.uk/nhli/r.newson/papers/censlope.pdf (Accessed: 08/09/2017).

Piketty, T. 2014. *Capital in the Twenty First Century*, Harvard, Harvard University Press.

Pollin, R. 1990. *Deeper in Debt. The Changing Financial conditions of U.S. Households*, Washington DC, Economic Policy Institute.

Schiel, R.W. 2011. *The Bootstrap and Jackknife Methods for Data Analysis* [Pdf slides]. Retrieved from: http://www.physik.uni-regensburg.de/sfbtr55/Seiten/talks/Rainer_jackboot.pdf

Sen, P.K. 1968. "Estimates of the regression coefficient based on Kendall's tau", *Journal of the American Statistical Association*, vol. 63, no. 324, pp. 1379-1389.

Servon, L. 2018. *The Unbanking of America. How the New Middle Class Survives*, New York, Mariner Books.

Setterfield, M., and Kim, Y.K. 2016. "Debt servicing, aggregate consumption, and growth", *Structural Change and Economic Dynamics*, vol. 36, pp. 22-33.

Somers, R. H. 1962. "A new asymmetric measure of association for ordinal variables", *American Sociological Review*, vol. 27, pp. 799-811.

Spearman, C. 1904. "The proof and measurement of association between two things", *American Journal of Psychology*, vol. 15, pp.72–101.

Stiglitz, J.E. 2014. "Phony Capitalism", *Harper's Magazine*, September 2014 issue.

Sullivan H., and Smeeding T., 1997. "Educational attainment and earnings inequality in eight nations", Luxembourg Income Study Working Paper No. 164.

Szymborska, H.K. 2017. *Financial sector and household balance sheet dynamics: Rethinking the determinants of income and wealth inequality in the USA since the 1980s.* PhD thesis, University of Leeds.

Taylor, P., and Pew Research Center. 2016. *The Next America*, Public Affairs. ISBN: 9781610396196.

Theil, H. 1950. "A rank invariant method of linear and polynomial regression analysis", I, II, III. *Proceedings of the Koninklijke Nederlandse Akademie Wetenschappen, Series A – Mathematical Sciences*, vol. 53, pp. 386–392, 521–525, 1397–1412.

U.S. Survey of Consumer Finances, 1989-2013, Federal Reserve. Available at: http://www.federalreserve.gov/econresdata/scf/scfindex.htm

Williams, R.B. 2016. *The Privileges of Wealth: Rising Inequality and the Growing Racial Divide*, Abingdon, Routledge.

Winship, C., and Radbill, L. 1994. "Sampling Weights and Regression Analysis", *Sociological Methods & Research*, vol. 23, no. 2, pp. 230-257.

Wolff, E.N. 2014. "Household wealth trends in the United States, 1983-2010", *Oxford Review of Economic Policy*, vol. 30, no. 1, pp. 21-43.

Wolff, E.N., and Zacharias, A. 2013. "Class structure and economic inequality", *Cambridge Journal of Economics*, vol. 37, pp. 1381-1406.

Wooldridge, J.M. 2002. Econometric Analysis of Cross Section and Panel Data, 1st edition, London, The MIT Press.

Wright, E.O. 2009. "Understanding Class. Towards an Integrated Analytical Approach", *New Left Review*, vol. 60, pp. 101-16.

Young, B. 2010. "The Gendered Dimension of Money, Finance and the Subprime Crisis". In: Bauhardt, C. and Caglar, G., eds., *Gender and Economics. Feministische Kritik der politischen Oekonomie*, Wiesbaden, VS Verlag für Sozialwissenschaften.

Table 1. Theil-Sen median slope for the median income ratio, full sample, 1989-2013 (source: own calculations based on the U.S. Survey of Consumer Finances)

Median income ratio	1989	1992	1995	1998	2001	2004	2007	2010	2013
Share of total assets									
Primary residence	0.32	0.13	0.22	0.24	0.18	0.20	0.25	0.25	0.27
Other property	2.22	2.60	2.23	2.84	3.52	3.34	3.20	3.03	3.94
Vehicles and other non-financial assets	-0.32	-0.30	-0.25	-0.41	-0.54	-0.54	-0.60	-0.56	-0.61
Business equity	2.30	2.41	2.35	2.71	3.45	3.05	4.11	3.15	4.18
Financial investment assets	2.06	2.05	2.09	2.09	2.60	3.38	3.16	3.56	4.13
Transaction accounts	*0.04*	0.42	0.41	*0.00*	-0.10	0.33	0.24	0.21	0.12
Retirement and insurance assets	4.36	3.35	2.32	2.39	2.44	3.37	2.92	2.95	2.81
N	15,207	18,956	20,965	20,940	21,612	22,191	21,694	31,616	29,500
Share of total debt									
Debt secured by primary residence	0.81	0.85	0.73	0.79	0.81	0.64	0.71	0.62	0.76
Debt secured by other property	2.44	2.31	1.97	1.80	2.12	2.58	2.92	2.78	2.36
Instalment debt	-0.62	-0.55	-0.33	-0.37	-0.36	-0.31	-0.43	-0.47	-0.48
Credit card balances	0.00	-0.50	-0.39	-0.47	-0.73	-0.53	-0.33	-0.16	-0.24
Other types of debt	0.68	0.61	*0.08*	0.48	-0.14	0.55	*0.00*	0.33	0.67
N	11,478	14,185	15,791	15,755	16,206	16,706	16,623	23,764	21,833
Leverage measures									
Debt-service-to-income ratio (DSY)	141.00	127.29	117.99	113.22	98.72	88.01	101.04	100.64	118.72
Debt-to-asset ratio	48.03	41.63	42.16	35.08	26.80	21.88	23.85	16.60	11.99
Debt-to-income ratio	46.31	35.96	27.94	27.11	26.65	17.47	18.94	14.63	17.41
N	15,710	19,530	21,495	21,525	22,210	22,595	22,080	32,410	30,075

Notes: Italics indicate confidence intervals of the Theil-Sen median slope which include zero.

Table 2. Theil-Sen median slope for the median income ratio, by percentile of income distribution, 1989-2013

Median income ratio	1989		1992		1995		1998		2001		2004		2007		2010		2013	
	Bottom 20 %	Top 10 %	Bottom 20 %	Top 10 %	Bottom 20 %	Top 10 %	Bottom 20 %	Top 10 %	Bottom 20 %	Top 10 %	Bottom 20 %	Top 10 %	Bottom 20 %	Top 10 %	Bottom 20 %	Top 10 %	Bottom 20 %	Top 10 %
Share of total assets																		
Primary residence	*0.00*	-1.66	0.00	-1.34	0.03	-1.15	*0.00*	-1.40	*0.00*	-1.58	0.02	-1.92	0.02	-2.33	0.03	-1.65	*0.00*	-2.05
Other property	0.15	0.76	0.06	1.40	*-0.02*	1.80	0.06	1.76	*0.02*	2.56	0.03	2.54	0.00	1.88	*0.00*	1.38	0.09	1.61
Vehicles and other non-financial assets	*0.00*	-7.07	0.01	-4.73	0.01	-4.40	0.04	-5.62	*0.00*	-10.57	*0.01*	-11.45	0.02	-14.76	*0.00*	-12.84	0.02	-16.40
Business equity	-0.12	2.43	0.08	2.74	-0.08	2.55	-0.08	4.06	*0.00*	5.85	*0.00*	4.29	-0.23	3.64	-0.15	3.11	*0.00*	6.58
Financial investment assets	0.08	2.86	0.03	1.09	*-0.02*	0.85	0.06	1.58	*0.03*	1.03	*0.00*	3.09	0.05	5.16	*0.00*	4.62	*0.00*	3.04
Transaction accounts	*0.00*	*0.72*	0.02	-0.55	0.02	*-0.28*	*0.00*	-1.01	*0.00*	*-0.66*	*0.00*	-1.59	*0.00*	*0.00*	*0.00*	*-0.18*	*0.00*	*-0.81*
Retirement and insurance assets	*0.00*	-0.53	*0.00*	0.48	0.03	*0.12*	*0.00*	-0.25	0.10	-0.93	0.06	-0.81	*0.00*	-0.33	0.05	-0.59	0.04	-1.01
N	1,840	4,523	2,264	6,132	2,540	6,438	2,843	6,451	2,823	6,548	3,074	6,800	2,829	7,001	5,188	7,096	4,585	7,078
Share of total debt																		
Debt secured by primary residence	*0.04*	-0.71	*0.00*	*0.00*	0.02	0.28	*0.01*	0.25	0.04	-0.11	*0.02*	-0.31	0.02	*0.10*	0.02	0.33	0.02	0.55
Debt secured by other property	0.14	1.15	-0.31	0.50	-0.10	1.17	*-0.01*	2.02	0.13	0.95	*0.03*	1.74	-0.14	2.11	-0.17	1.74	0.04	0.93
Instalment debt	*-0.04*	-0.75	*0.00*	-0.80	*0.00*	-1.40	-0.03	-1.56	-0.03	-1.69	*0.00*	-1.35	*-0.02*	-3.29	-0.02	-2.30	-0.02	-2.30
Credit card balances	0.04	-5.64	*0.00*	-5.97	0.01	-4.21	*0.00*	-5.40	*0.00*	-1.91	*0.00*	-5.80	*0.00*	-5.02	0.02	-5.66	0.02	-9.34
Other types of debt	0.00	1.01	*0.00*	0.81	*0.00*	*0.44*	*0.00*	0.96	*-0.03*	5.51	*0.00*	*0.74*	*-0.04*	*0.26*	*0.00*	-0.93	*-0.04*	*0.00*
N	1,091	3,578	1,403	4,471	1,570	4,547	1,628	4,843	1,630	4,644	1,808	4,730	1,695	5,065	3,162	5,093	2,662	5,001
Leverage measures																		
Debt-service-to-	*0.00*	-503.9	*-0.54*	-236.4	3.42	-252.5	3.05	-268.8	3.24	-440.4	4.41	-447.0	*0.00*	-555.5	3.26	-340.0	*0.00*	-726.0

income ratio																		
Debt-to-asset ratio	*0.00*	-192.7	*0.00*	-111.2	0.93	-104.8	0.80	-137.7	0.24	-174.7	0.35	-239.6	*0.00*	-225.1	*0.00*	-113.6	0.00	-230.9
Debt-to-income ratio	0.00	-50.74	-0.29	-16.57	*0.26*	-20.84	*0.00*	-23.53	0.63	-35.35	*0.00*	-32.78	*0.00*	-32.31	*0.00*	-14.28	*0.00*	-44.56
N	2,253	4,523	2,746	6,137	2,988	6,438	3,322	6,451	3,348	6,548	3,384	6,800	3,169	7,001	5,804	7,096	5,024	7,078

(source: own calculations based on the U.S. Survey of Consumer Finances)

Notes: Italics indicate that the Theil-Sen median slope is not statistically different from zero. Underlined estimates indicate overlapping confidence intervals.

Table 3. Theil-Sen median slope for the median income ratio, by gender of household head, 1989-2013
(source: own calculations based on the U.S. Survey of Consumer Finances)

Median income ratio	**1989**		**1992**		**1995**		**1998**		**2001**		**2004**		**2007**		**2010**		**2013**	
	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male
Share of total assets																		
Primary residence	0.09	0.46	-0.02	0.16	0.08	0.17	0.05	0.26	*0.00*	0.09	0.12	0.11	0.12	0.22	0.16	0.24	0.14	0.20
Other property	0.53	1.84	0.89	1.52	0.61	0.61	1.24	1.79	1.30	1.40	1.64	0.98	0.79	0.95	1.02	1.09	1.72	1.50
Vehicles and other non-financial assets	0.07	-0.29	0.18	-0.09	0.12	-0.19	0.08	-0.39	*0.00*	-0.22	*0.00*	-0.37	-0.02	-0.37	-0.05	-0.21	*0.00*	-0.22
Business equity	3.34	0.59	0.63	0.54	1.40	0.41	2.00	1.20	1.57	0.84	0.71	1.24	4.61	1.43	1.32	1.23	1.93	1.61
Financial investment assets	0.74	0.82	0.52	1.25	0.62	0.99	0.79	1.06	0.89	1.33	1.07	1.06	0.73	1.68	1.05	1.08	0.83	0.88
Transaction accounts	0.17	*-0.08*	0.30	0.10	0.10	*0.07*	0.16	-0.14	*-0.01*	*0.00*	*0.00*	0.26	0.08	*0.00*	*0.00*	*0.00*	*0.00*	*-0.02*
Retirement and insurance assets	2.27	2.62	1.26	2.15	1.21	0.86	0.98	1.29	1.00	1.42	1.59	1.66	1.57	1.73	1.44	1.70	1.33	1.46
N	3,001	1,565	3,745	2,487	4,063	2,530	4,225	2,775	4,227	2,650	4,511	2,859	4,250	2,599	6,916	4,560	6,600	4,170
Share of total debt																		
Debt secured by primary residence	0.51	0.60	0.41	0.50	0.38	0.37	0.38	0.61	0.33	0.41	0.28	0.38	0.41	0.52	0.35	0.48	0.36	0.39
Debt secured by other property	0.91	0.61	0.88	3.28	0.42	1.10	0.85	0.80	1.12	0.92	2.02	0.62	0.75	1.05	1.02	0.64	1.00	1.06
Instalment debt	-0.24	-0.57	-0.19	-0.28	-0.15	-0.30	-0.10	-0.34	-0.10	-0.13	-0.07	-0.29	-0.14	-0.44	-0.24	-0.29	-0.20	-0.33
Credit card balances	0.16	0.16	*0.00*	-0.19	-0.08	*0.03*	-0.06	-0.32	-0.11	-0.21	-0.11	-0.17	-0.09	*-0.04*	*-0.01*	*0.00*	0.07	0.09
Other types of debt	*0.00*	*0.20*	0.20	0.40	0.17	-0.17	0.11	*-0.06*	-0.26	-0.23	*0.00*	0.19	*-0.02*	*-0.03*	*0.02*	*0.00*	-0.11	-0.001
N	1,905	1,066	2,523	1,682	2,797	1,831	2,724	1,993	2,861	1,810	3,187	2,018	2,933	1,861	4,854	2,993	4,569	2,715
Leverage measures																		
Debt-service-to-income ratio	77.67	161.56	90.41	72.83	74.53	98.40	74.13	123.64	68.41	85.58	64.71	57.91	65.21	107.90	64.62	102.49	67.78	77.21

Debt-to-asset ratio	17.39	45.11	29.46	12.62	23.74	24.16	17.07	14.55	16.63	23.48	12.75	9.60	11.73	14.20	6.19	19.19	4.07	2.87
Debt-to-income ratio	24.40	43.71	21.76	16.48	16.22	14.94	15.09	19.93	14.84	16.71	10.47	7.64	11.50	16.80	7.65	12.91	7.94	5.17
N	3,360	1,675	4,105	2,590	4,435	2,590	4,575	2,890	4,600	2,760	4,735	2,930	4,450	2,715	7,285	4,765	6,910	4,320

Notes: Single households only. Italics indicate that the Theil-Sen median slope is not statistically different from zero. Underlined estimates indicate overlapping confidence intervals.

Table 4. Theil-Sen median slope for the median income ratio, by race of household head, 1989-2013
(source: own calculations based on the U.S. Survey of Consumer Finances)

Median income ratio	1989		1992		1995		1998		2001		2004		2007		2010		2013	
	Black/ Latino	White/Other	Black/ Latino	White/Other	Black/ Latino	White/Other	Black/ Latino	White/Other	Black/ Latino	White/Other	Black/ Latino	White/Other	Black/ Latino	White/Other	Black/ Latino	White/Other	Black/ Latino	White/Other
Share of total assets																		
Primary residence	0.13	0.33	*0.00*	0.12	0.29	0.15	0.15	0.21	0.33	*0.05*	0.13	0.15	0.36	0.14	0.28	0.15	0.28	0.11
Other property	1.66	2.14	1.83	2.58	0.96	2.30	2.36	2.74	3.80	3.23	1.76	3.53	2.04	3.41	2.32	2.97	1.99	4.03
Vehicles and other non-financial assets	*0.00*	-0.44	0.03	-0.44	0.11	-0.40	*0.00*	-0.59	-0.04	-0.77	-0.05	-0.80	-0.21	-0.78	-0.11	-0.82	-0.10	-0.93
Business equity	4.10	2.09	1.72	2.35	1.78	2.24	5.66	2.29	3.01	3.27	1.90	2.86	2.30	4.22	1.72	3.09	2.02	4.54
Financial investment assets	4.95	1.41	3.47	1.53	2.48	1.74	3.42	1.66	4.30	2.18	5.53	2.48	8.56	2.31	3.43	2.95	2.14	3.60
Transaction accounts	1.22	-0.22	0.64	*0.06*	0.66	0.16	0.65	-0.21	*0.00*	-0.19	0.34	0.11	0.22	0.11	0.10	0.22	*0.00*	0.26
Retirement and insurance assets	3.87	4.03	1.40	3.66	0.89	2.65	0.96	2.61	1.39	2.58	1.85	3.51	2.52	2.85	1.78	3.04	1.47	2.93
N	1,956	13,251	2,473	16,483	2,446	18,519	2,924	18,016	3,277	18,335	3,865	18,326	3,365	18,329	6,608	25,008	6,103	23,397
Share of total debt																		
Debt secured by primary residence	0.57	0.81	0.54	0.87	0.46	0.73	0.49	0.82	0.48	0.85	0.38	0.68	0.61	0.69	0.45	0.64	0.47	0.76
Debt secured by other property	3.58	2.09	4.20	2.08	1.00	2.03	1.62	1.77	2.89	1.91	0.71	3.07	1.73	3.44	2.08	2.78	1.23	2.50
Instalment debt	-0.39	-0.65	-0.12	-0.66	-0.10	-0.37	-0.18	-0.41	-0.08	-0.45	-0.12	-0.36	-0.27	-0.46	-0.28	-0.51	-0.26	-0.50
Credit card balances	0.51	-0.24	*-0.04*	-0.66	0.23	-0.56	0.09	-0.64	-0.11	-0.94	-0.05	-0.71	*0.00*	-0.44	0.27	-0.36	0.28	-0.57
Other types of debt	0.38	0.61	1.08	0.45	-0.24	0.28	-0.15	1.04	*-0.09*	-0.22	0.24	0.82	0.26	*-0.05*	*0.07*	0.54	*0.07*	1.29
N	1,646	9,832	2,039	12,146	2,065	13,726	2,283	13,472	2,664	13,542	2,945	13,761	2,718	13,905	5,007	18,757	4,746	17,087
Leverage measures																		
Debt-service-to-income ratio	153.08	125.93	130.91	112.78	118.38	108.48	128.20	99.63	114.83	86.03	91.61	74.47	127.38	85.72	129.74	73.92	129.83	96.67
Debt-to-asset ratio	40.52	50.07	29.34	45.60	33.85	45.50	32.08	35.57	33.46	26.66	25.98	19.20	25.78	25.99	26.22	11.33	13.28	14.74

Debt-to-income ratio	47.33	42.27	38.46	32.49	25.20	26.54	25.83	25.22	27.02	24.74	17.72	15.20	19.98	17.69	17.70	11.64	16.72	15.61
N	2,339	13,371	2,879	16,651	2,785	18,710	3,322	18,203	3,705	18,505	4,159	18,436	3,616	18,464	7,149	25,261	6,512	23,563

Notes: Italics indicate that the Theil-Sen median slope is not statistically different from zero. Underlined estimates indicate overlapping confidence intervals.

Table 5. Theil-Sen median slope for the median income ratio, by cohort, 1989-2013 (source: own calculations based on the U.S. Survey of Consumer Finances)

Median income ratio	2001		2004		2007		2010		2013	
	Baby boomers	Millennials	Baby boomers	Millennials	Baby boomers	Millennials	Baby boomers	Millennials	Baby boomers	Millennials
Share of total assets										
Primary residence	0.30	0.47	*0.00*	0.59	*0.00*	0.59	*0.00*	0.68	*0.00*	0.76
Other property	4.37	1.46	3.81	0.40	3.72	1.65	4.64	1.28	4.30	1.99
Vehicles and other non-financial assets	-1.49	*-0.03*	-1.45	-0.06	-1.40	-0.12	-1.42	-0.19	-1.28	-0.36
Business equity	3.20	1.09	3.36	*0.06*	3.86	1.34	4.53	1.34	4.05	1.68
Financial investment assets	5.98	0.79	6.79	-0.14	8.50	0.48	8.18	1.05	6.59	1.17
Transaction accounts	0.88	*0.00*	2.65	-0.08	3.96	*0.00*	2.47	-0.13	1.27	-0.19
Retirement and insurance assets	2.33	0.20	2.92	3.55	2.64	1.77	2.81	3.10	2.55	2.47
N	9,611	285	9,788	843	9,283	1,435	13,271	3,520	12,035	4,545
Share of total debt										
Debt secured by primary residence	0.90	0.33	0.68	0.51	0.72	0.55	0.63	0.69	0.70	0.88
Debt secured by other property	2.41	1.30	2.66	0.24	3.16	1.24	3.24	1.45	2.32	1.18
Instalment debt	-0.48	*-0.02*	-0.30	-0.17	-0.54	-0.11	-0.51	-0.50	-0.47	-0.59
Credit card balances	-1.08	0.08	-1.07	*0.00*	-0.52	-0.28	-0.47	0.20	-0.65	0.28
Other types of debt	-0.15	-0.25	0.56	-0.11	-0.42	0.77	0.60	0.13	0.91	*0.04*
N	8,146	230	8,181	642	7,783	1,163	10,432	2,781	9,146	3,502
Leverage measures										
Debt-service-to-income ratio	24.08	26.61	9.47	78.67	*0.00*	130.56	27.52	158.37	49.30	167.88
Debt-to-asset ratio	-0.17	3.48	-0.84	2.44	*0.00*	5.61	*0.81*	3.57	9.41	1.91
Debt-to-income ratio	17.30	4.85	12.39	4.39	9.46	15.12	9.60	13.47	14.29	13.67
N	9,773	332	9,943	892	9,425	1,505	13,495	3,740	12,240	4,690

Notes: Baby boomers are respondents born between 1946 and 1964. Millennials are respondents born between 1980 and 1995. Italics indicate that the Theil-Sen median slope is not statistically different from zero. Underlined estimates indicate overlapping confidence intervals.

Table 6. Goodness-of-fit measures in regression analysis, 1989-2013 (source: own calculations based on the U.S. Survey of Consumer Finances)

Median income ratio	**1989**		**1992**		**1995**		**1998**		**2001**		**2004**		**2007**		**2010**		**2013**	
	RMSE	Adj. R^2	RMSE	Adj. R^2	RMSE	Adj. R^2	RMSE	Adj. R^2	RMSE	Adj. R^2	RMSE	Adj. R^2	RMSE	Adj. R^2	RMSE	Adj. R^2	RMSE	Adj. R^2
Controls only	**103.11**	**0.36**	**95.90**	**0.39**	**89.50**	**0.40**	**100.83**	**0.36**	**119.72**	**0.32**	**106.33**	**0.38**	**126.44**	**0.32**	**126.24**	**0.33**	**135.52**	**0.34**
N	**13,520**		**16,289**		**18,253**		**18,667**		**18,932**		**18,913**		**18,446**		**28,995**		**26,649**	
Share of total assets																		
Primary residence	*105.18*	*0.35*	97.09	0.38	90.66	0.38	101.96	0.36	121.13	0.31	106.89	0.38	127.32	0.32	127.16	0.33	136.23	0.34
Other property	105.01	0.35	96.76	0.39	90.44	0.39	101.68	0.36	120.72	0.31	106.67	0.38	126.89	0.32	126.95	0.33	136.28	0.34
Vehicles and other non-financial assets	104.03	0.36	96.31	0.39	89.85	0.40	100.78	0.37	119.76	0.32	105.94	0.39	126.54	0.33	126.47	0.34	135.40	0.35
Business equity	105.04	0.35	96.94	0.38	90.34	0.39	101.92	0.36	120.69	0.31	106.64	0.38	126.73	0.33	126.93	0.33	135.65	0.35
Financial investment assets	104.62	0.35	96.75	0.39	90.27	0.39	101.12	0.37	119.84	0.32	106.35	0.38	126.65	0.33	126.11	0.34	135.28	0.35
Transaction accounts	105.04	0.35	97.14	0.38	90.74	0.38	102.02	0.35	121.10	0.31	107.00	0.37	127.59	0.32	127.43	0.33	136.49	0.34
Retirement and insurance assets	105.01	0.35	96.86	0.38	90.53	0.39	101.67	0.36	120.99	0.31	106.32	0.38	127.34	0.32	126.87	0.33	135.90	0.35
N	13,050		15,732		17,738		18,082		18,394		18,546		18,085		28,221		26,102	
Share of total debt																		
Debt secured by primary residence	107.51	0.34	99.29	0.40	91.79	0.39	104.70	0.35	119.98	0.32	106.52	0.38	130.29	0.31	127.62	0.33	139.37	0.34
Debt secured by other property	107.44	0.34	99.87	0.39	91.81	0.39	105.24	0.35	120.38	0.32	106.20	0.39	128.70	0.33	125.87	0.35	140.14	0.33
Instalment debt	107.25	0.35	99.56	0.39	91.80	0.39	105.06	0.35	120.43	0.32	106.40	0.38	130.10	0.32	127.15	0.34	139.59	0.34
Credit card balances	108.25	0.33	100.16	0.39	92.28	0.38	105.30	0.34	120.57	0.32	106.88	0.38	130.48	0.31	127.96	0.33	140.14	0.33
Other types of debt	108.56	0.33	*100.63*	*0.38*	*92.48*	*0.38*	105.81	0.34	*121.24*	*0.31*	*107.13*	*0.37*	130.95	0.31	128.20	0.33	*140.54*	*0.33*
N	9,863		12,069		13,778		13,914		14,239		14,564		14,416		21,710		19,802	
Leverage measures																		
Debt-service-to-income ratio	102.76	0.37	95.30	0.40	89.35	0.40	100.56	0.37	118.68	0.33	105.72	0.38	125.11	0.34	125.33	0.34	134.36	0.36
Debt-to-asset ratio	103.08	0.36	95.88	0.39	89.50	0.40	100.83	0.36	*119.72*	*0.32*	106.33	0.38	*126.44*	*0.32*	126.25	0.33	135.52	0.34
Debt-to-income ratio	102.92	0.36	95.69	0.39	89.33	0.40	100.74	0.37	119.25	0.32	106.16	0.38	125.80	0.33	125.70	0.34	134.63	0.35
N	13,520		16,289		18,253		18,667		18,932		18,913		18,446		28,995		26,649	

Notes: Each of the balance sheet variables is estimated in a separate regression. Italics indicate that the extra-sum-of-squares F-test is not statistically significant at 5% level, so that the null hypothesis (the reduced model with controls only is preferred) cannot be rejected. Full results are available on request.